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Method of Constructing Beton Arches.

WE supplement the article published last week, on the "La Vanne Aqueduct," by giving in our present number a description and illustration of the manner in which the centres are made for arches constructed of béton. We found that it works with such ease and precision, that we are induced to speak of it here at greater length.

We represent in FIG. 1 the sand-box, used for lowering the centres, seen in sectional elevation; and in FIG. 2, a sketch of the general arrangement of the centres. In order to build those enormous centres, (some of them one hundred and eighty feet span), so that they can be lowered without any gearing, and to avoid the expensive use of metal screws, the following method is adopted:

The piles, A, are first driven in the ground by rams two feet apart—or, when the nature of the soil admits of it, they merely rest upon sleepers. They are sawed off level, and upon their ends the cast-iron boxes, B, are placed. These boxes, B, have near their bottom several holes, which are stopped up by wooden plugs, or corks, C, C. The boxes, B, are now filled with fine and perfectly dry sand, represented by the letter S, in FIG. 1. The pieces, D, having their bottoms perfectly flat, and the lower end of proper size to enter freely in the boxes, B, are placed upon the bed of dry sand, S; and with a handful of plaster of Paris, the part, F, is made tight, to prevent any water from running into the box, B, and moistening the sand, S. To the pieces, D, are tenoned the side pieces, G, G, L, and the whole is braced by horizontal pieces, E, E, bolted thereto; the centre, or mould, for the formation of the concrete arch, is finally established upon the top, and the whole weight actually rests upon the beds of dry sand in the boxes, B.

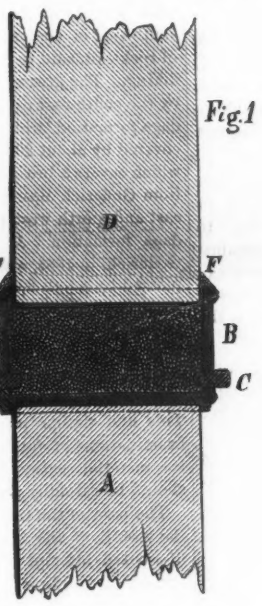


Fig. 1

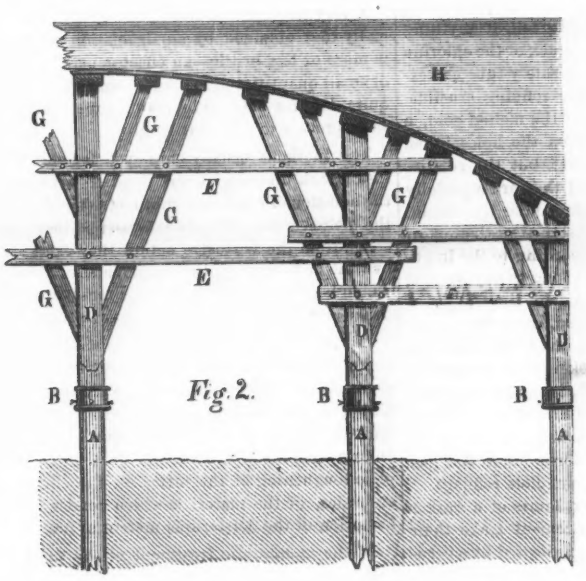


Fig. 2.

When the time for taking down the centres has arrived—which, for the one we now describe, has been nineteen days after the arches were completed, one workman is placed in charge of each of the boxes, B; all the plugs, C, are carefully loosened, but not withdrawn; and, everybody being ready, awaits the word of command from the superintendent. The words, "Let go!" being given, all the plugs, C, are withdrawn simultaneously, the dry sand, S, runs off from the boxes, B, and the pieces, D, having no support, sink into the boxes, B; the whole centre settles down at once, as easily and evenly as if worked by accurate machinery.

A Process for Quickly and Accurately Determining the Amount of Chromium and Iron in Chrome Iron Ores.

By J. BLODGET BRITTON.

REDUCE the mineral to the finest state of division possible, in an agate mortar. Weigh off 0.5 grammes, and add to it 4.0 grammes of a flux, previously prepared, composed of one part chlorate of potassa and three parts soda-lime; throughly mix the mass by triturating in a porcelain mortar, and then ignite in a covered platinum crucible, at a bright red heat, for an hour and a half or more. The mass will not fuse, but, when cold, can be turned out of the crucible by a few gentle taps, leaving the interior of the vessel clean and bright. Triturate in the mortar again, and turn the powder into a tall 4 ounce beaker, and add about 18 c. c. of hot water, and boil for two or three minutes; when cold, add 15 c. c. of hydrochloric acid of common strength, and stir with a glass rod for a few minutes, till the solid matter, with the exception, probably, of a little silica in a flaky, gelatinous state, becomes dissolved. Both the iron and chromium will then be in the highest state of oxidation—Fe_2O_3 and CrO_3. Pour the fluid into a white porcelain dish, of about 20 ounces capacity, and dilute with the washings of the breaker to about 3 ounces. Immediately after, also, pour cautiously into the dish 1.0 gramme of metallic iron of known purity, previously dissolved in dilute sulphuric acid, and further diluted with water to about 5 ounces, to make up the volume in the dish to about 8 ounces. (I use for the purpose fresh borings from a piece of bar iron, containing less that 0.05 of foreign matter, dissolved in 18 c. c. of dilute sulphuric acid, of 1 part acid and 3½ parts water, in a tube twelve inches long and seven-eighths of an inch diameter, closed at the top with a gum stopper perforated for a quarter-inch tube, bent short round at right angles, and extending horizontally about three or four inches, applying heat to expel atmospheric air and facilitate operations). When the iron is dissolved, and having tested the solution for sesquioxide, I nearly fill the tube with *cold* water, and cautionsly pour the contents into the dish, and add about two tubesful more of *cold* water, to make up the solution to about 8 ounces, and then determine, volumetrically, with a standard solution of permanganate of potash, the amount of protoxide of iron remaining. The difference between the amount of iron found and of the iron weighed will be the amount oxidized to sesquioxide by the chromic acid. Every one part so oxidized will represent 0.320 of metallic chromium, or 0.4663 of sesquioxide, Cr_2O_3, in which last condition the substance usually exists in the ore.

If the amount of iron only in the ore is to be determined, the process is still shorter. After the fluxed mineral has been ignited and reduced to powder, as already directed, dissolve it in a tube of the kind described, by adding, first, 10 c. c. of hot water, and applying a gentle heat, and then 15 c. c. of hydrochloric acid, continuing the heat to incipient boiling till complete decomposition has been effected; cool by immersing the tube in a bath of cold water; add pieces of pure metallic zinc, (sheet zinc cut in small strips I prefer), sufficient to bring the iron to the condition of protoxide and the chromium to sesquioxide, and apply heat till small bubbles of hydrogen cease, and the zinc has become quite dissolved; then nearly fill the tube with *cold* water, acidulated with one-tenth of sulphuric acid, and pour the contents into the porcelain dish; add *cold* water to make up the volume to about 8 ounces, and complete the operation with the standard permanganate solution.

The process, if conducted as directed, affords very accurate results; upon repeating the determinations, there should be, practically, no variation. The whole time consumed need not exceed three hours, to determine both the chromium and the iron, if the two ignitions are proceeded with simultaneously.

It need scarcely be remarked, that fine iron wire or ammonio-protosulphate of iron may, in most cases, be used with greater convenience than borings. I, however, in my own practice, prefer the latter, and for several years past have kept in the laboratory for use a large piece of iron of the kind mentioned, from which, by the aid of a small foot-lathe, I obtain, in a moment or two, clean unoxidized borings whenever they are needed, and thus have an unalterable standard always at hand.

For dissolving minerals and metals, I constantly use tubes of the kind described, though sometimes of a larger size, preferring them generally to all other vessels, for many reasons—avoidance of loss of substance, convenience of rinsing, expulsion of air while digesting and boiling, carrying out of the laboratory all of the evolved gases by means of the small bent tubes leading into a chamber connected with the main chimney, etc.

When determining iron volumetrically with the permanganate solution, I also always use the cold water, acidulated with sulphuric acid, when hydrochloric acid has been the solvent, because, with it, the final relation is more distinct and the results more constant; besides, if previously prepared in quantity, and cold, it at once reduces the temperature of the hot fluid, and so saves time.—*Journal of the Franklin Institute.*

The Packing of Petroleum and Its Products.

SEVERAL months ago, we published an article on the packing of petroleum and its products, which demonstrated the only mode of packing them, that would guarantee absolute safety against loss by leakage or evaporation during transportation, and insure the carrying vessel against the possibility, in the case of a cargo of naphtha, of destruction by the explosion of that fluid, in consequence of contact between the explosive vapor which naphtha emits and the fire in the galley stove or the ship's lights. That article was suggested by the burning, last autumn, of a vessel laden with naphtha in barrels, while at anchor off Staten Island. The recent increase in the export of naphtha, and the fact that only a portion of the amount supplied is packed in metal cans, renders it necessary that we should again call the attention of exporters to the importance of adopting the only trustworthy safeguard against the accidents now so frequent, resulting from leakage and evaporation.

Naphtha, of every gravity, constantly emits an explosive vapor, when not put up in absolutely tight metal packages. Those who have shipped the largest quantities of this fluid in barrels, would certainly be the most willing to verify this statement. In the case of a cargo of naphtha in barrels, this vapor, after filling the hold, forces its way out, and no amount of skill on the part of those in charge of the vessel can prevent it from finding its way to some one or more of the lights which are indispensable to the navigation of a ship. It is a case where chance, and not the captain, is master for the voyage. These facts being a part of the experience of those who transport petroleum and its products, the question has been raised, "What material for packing will render a cargo of naphtha absolutely safe against loss by leakage, evaporation, or explosion?" There is but one answer: The naphtha must be packed in small quantities to the single package, in order to reduce to the minimum the inherent tendency of the fluid to self-combustive working. Instead of being packed in wooden barrels, of forty gallons each, naphtha ought to be packed in tin cans, (tin, from its lightnesss, tightness, cheapness, and facility of manipulation, being the only available metal), and these cans ought not to contain more than ten gallons each, while five gallons each would be a safer quantity. These cans may be very easily and cheaply, and, at the same time, sufficiently protected by a thin casing of pine, into which they may be placed with an absolutely tight fit. This not only insures protection against explosion, but it also prevents waste from leakage. We know of a vessel that left this port for Antwerp, last September, loaded with 1,700 barrels of naphtha. The fluid was of the usual gravity, and the appointed inspector certified that the barrels were in "prime shipping order." In thirty-five days from the date of sailing, the cargo was safely landed in Antwerp, when it was found that out of the 1,700 full barrels, 195 had been lost solely by evaporation and leakage. If the same quantity of naphtha had been properly packed in tin cans, of five gallons each, there would have been no evaporation or leakage whatever. Naphtha bought in tin cans reaches its destination just the same in quantity as that which was paid for when it left the docks, which never can be the case when the same fluid is put up in barrels. Exporters would do well to bear in mind, that the only party who loses money on naphtha, in consequence of evaporation, is the party who packs it. As it is delivered to the ship, and paid for by the exporter when put up in tin cans, so it is delivered by the ship to the consignees. The economy, then, of shipping naphtha packed in tin cans, and the inevitable waste that attends its exportation in wooden barrels, are demonstrated. It should be also constantly borne in mind that the same economical rules which apply to the packing of naphtha in tin vessels, apply, in principle, with equal cogency to the packing of crude and refined oil for shipment. In fact, no part of petroleum or its products, excepting only residuum, ought ever to be sent abroad in barrels; and it would be good economy for refiners and exporters to adopt the suggestions herein offered, as a means of rendering the transportation of the commodities named absolutely safe and satisfactory to all parties. Moreover, if petroleum and its products were to be exclusively exported in metal packages, we are sure that insurance companies would reduce their rates.—*Phila. Bulletin.*

Gold Refining by Chlorine Gas.

Read before the Royal Society of Victoria, by F. B. MILLER, F. C. S., Assayer in the Sydney Branch of the Royal Mint.

VERY many thousand ounces (upwards of 200,000 ounces) have now been refined by this process; and the mode of operation which has, in practice, been found the most advantageous has been as follows:—

The French crucibles (say, size 17 or 18), duly prepared with borax, having been placed in the cold furnace, and slowly and carefully heated to dull redness, the gold (from 600 to 700 ounces to each crucible) is introduced, and the fire urged until the metal is melted, the necessary generation of chlorine having meantime been commenced by the introduction of a little hydrochloric acid, poured down the safety-tube, into the generators.

In order to fill the pots, and avoid the risk of splitting them by the wedging of the ingots at their contracted bottom, the gold for refining is cast in moulds of a peculiar form. Two inches, from end end, the sides and bottom of the iron ingot moulds converge so as to produce a slipper-shaped ingot, two of which, placed face to face, fit conveniently into the pot.

As soon as the gold is melted, from 2 to 3 ounces of borax in a state of fusion, is poured upon its surface. If the borax is added sooner, it acts too much on the lower part of the pot; and, if thrown in cold, is apt to chill the gold. The clay-pipe which is to convey the chlorine to the bottom of the melted gold is now introduced. (It is necessary to carefully heat the lower portion of this pipe for some ten minutes before introducing it into the molten gold, or it is apt to split.) At the moment of its entering the melted gold, the screw compression clamp is slightly loosened, so as to allow a small quantity of gas to pass through it, and thus prevent any metal rising and setting in the pipe, which is then gradually lowered to the bottom of the molten gold, where it is kept by means of a few small weights attached to the top. The compression-tap is now quite relaxed, and the gas is heard bubbling up through the melted metal, which it does quietly and without projection of globules from the pot.

Sufficient hydrochloric acid must be added to the generators, from time to time, to keep up a rapid evolution of chlorine. A rough general rule is to allow 1 imperial quart of acid of 1.15 specific gravity to every 10 ounces of silver in the ally operated on. The column of liquid in the safety-tube, acting, as it does, like a barometer, affords a ready means of knowing the pressure in the generator, and of judging of the rate of production of the gas, as well as at once showing, by its fall, if anything irregular has occurred—such as a leak or a crack of the chlorine pipe or pot. From 16 to 18 inches in the safety-tube correspond to and balance 1 inch of gold in the refining crucible. When the chlorine is first introduced into the melted gold, a quantity of fumes are seen to pass up from the holes in the crucible-lid; these are not chloride of silver, but the volatile chlorides of some of the baser metals, and they are especially dense when much lead is present in the alloy under treatment, forming a white deposit on any cold substance presented to them. After a time, longer or shorter, according to the impurities in the gold, these fumes cease. So long as any decided quantity of silver is present in the molten gold, the whole, or nearly the whole, of the chlorine is absorbed, little, if any, appearing to escape, and to be thus wasted; and it is found that the better the supply of chlorine the quicker is the operation.

It is a curious circumstance that, though, in toughening with corrosive sublimate, this substance is only thrown on the surface of the melted gold, yet the whole mass is toughened by its action. It seems essential, in using chlorine, that the gas should pass to the very bottom to effect a complete refinage.

As soon as the operation is nearly over, fumes of a darker color than those observed at the commencement make their appearance; and the end of the refinage is indicated by a peculiar flame or luminous vapor of a brownish yellow color (occasioned by the free and now waste chlorine escaping), which can be seen on removing a small plug which fits into a hole in the lid of the pot. This, however, of itself, is not a sufficient indication: the process is not complete until this flame imparts to a piece of white tobacco-pipe, or similar substance, when held in it for a moment, a peculiar reddish or brownish yellow stain; so long as it gives any other color, the refinage is unfinished.

When these appearances are observed (usually for gold containing about 10 per cent. of silver in about an hour and a half from the introduction of the chlorine), the gas is shut off, and the pots removed from the fire, the white crucible lifted out of the black one, and, together with its contents, allowed to stand seven minutes, until the gold becomes cool enough to set or solidify. The chloride of silver, which remains liquid much longer, is then poured off into iron moulds. The crucible is then inverted on an iron table, when the still red-hot gold falls out in the shape of a cone; this is slightly scraped, and then thrown, hissing, into a concentrated solution of common salt, to free it from any adherent chloride of silver.

An alloy containing originally 89 per cent. of gold, 10 per cent. of silver, and 1 per cent. of base metals, will yield, on an average, a cake of chloride weighing, with a little adherent borax, 16 ounces for every 100 ounces operated on.

It is necessary very carefully to dry and heat the moulds into which the chloride of silver is poured, as the slightest moisture causes the latter to be violently dispersed while red hot, to the great risk of the bystanders. With ordinary care, this will never happen; but attention is called to the point, as a very deliquescent chloride of iron is apt to form on the moulds.

The gold is now fine, and simply requires re-melting into ingots.

As before stated, it is found that all these operations can readily be performed, and about 2000 ounces refined per day in three common melting-furnaces, between 9 A. M. and 2 P. M.; 98 per cent. of the gold originally contained in the alloy operated on is then ready for delivery.

The other 2 per cent. remains with the chloride of silver, partially in the metallic state, and partly in a state of combination with chlorine, and probably silver.

To free the chloride of silver from this combined gold (that mechanically mixed being eliminated at the same time), it is melted in a boraxed white pot, with the addition of from 8 to 10 per cent. of metallic silver, rolled to about ⅛ inch thickness. The chloride of gold is, by this means, reduced at the expense of the metallic silver, chloride of silver being formed; while the liberated gold sinks, and melts into a button at the bottom of the pot. As soon as the whole is thoroughly melted, the pot is removed from the furnace, and allowed to stand about ten minutes; and the still liquid chloride of silver is then poured into large iron moulds, so as to form slabs of a convenient thickness, for the next operation, that is, its reduction to the metallic state.

After the fusion of the chlorides, a small quantity of a curious spongiform substance adheres to the sides of the crucible used, probably consisting of subchloride of silver; but, since it always contains a little gold, care has to be taken in pouring off the fluid chlorides, to prevent this auriferous sponge from falling out and mixing with them.

The fusion of the chlorides with metallic silver does not remove every trace of gold; but, with proper care, the amount remaining in the silver produced need not exceed 3 parts in 10,000, or about 2 grains of gold in every pound (troy) of silver—a quantity too small to pay for further extraction in this colony.

The slabs of chloride of silver are reduced, without difficulty, by plates of wrought-iron or zinc, in the usual way; but my friend and colleague, Dr. LEIBIUS, has contrived a very excellent apparatus for this purpose.

The Manager of the Bank of New South Wales has kindly allowed me the use of 500 ounces of Queensland gold to illustrate this paper. This quantity was divided into two nearly equal parts: one portion, weighing 248 ounces, was left in its original unrefined condition, as seen in the ingot on the table; the other portion, weighing 252 ounces, was refined in the manner described above, and the resulting bar of fine gold, assaying 995, is placed by the unrefined ingot for comparison, and the silver extracted, weighing 38.8 ounces and assaying 991.1, lies beside it.

Besides the separation and recovery of the silver as above described, another useful end is gained by this process.

A very large proportion of the gold of Australia (more especially that obtained by amalgamation from our quartz-veins) is more or less brittle—an effect generally due to the presence of small quantities of lead or antimony, rendering the bullion quite unfit for coinage or manufacture until it has undergone some process to render it tough.

The methods usually employed for this purpose are either fusion with nitre and borax, melting with oxide of copper, or the addition of corrosive sublimate (bichloride of mercury) to the melted gold. The two former of these plans are troublesome, from the corrosive action they exert on the crucibles; and the last (namely, the employment of corrosive sublimate, which is that usually adopted) is most objectionable, from the dense and highly injurious fumes evolved.

In Victoria, this is regarded as so serious a matter, in a public and sanitary point of view, as to have induced the Municipal Council of Melbourne to institute an action at law against the Union Bank, to compel them to abate the nuisance thus created by their gold-melting establishment. The passage of chlorine-gas through the melted gold is found to effect the complete toughening of the metal by the elimination, as volatile chlorides, of the materials which render it brittle, while the evolution of the deleterious mercurial fumes is avoided.

In the metallurgic treatment of the precious metals, some loss is always sustained; but that incurred in the process here described is not found to be excessive.

The average loss of gold in operating hitherto has been found to amount to 19 parts in every 100,000 of alloy treated, which is considerably less than would be met with in toughening an equal amount of gold with corrosive sublimate in the ordinary manner.

The loss of silver has amounted to 240 parts in every 100,000 of alloy operated on (containing, originally, say 10 per cent. of silver). There is no doubt that a considerable portion of both these losses would be recovered on further treating the pots and ashes remaining after the operation; and it is found that, as manipulatory skill is acquired, the proportional loss of silver appears to be decreasing. In refining, on the large scale, gold containing 10 per cent. of silver, the cost of the operation in Sydney, including labor and the above lossess of gold and silver, but exclusive of rent of premises and superintendence, is about five farthings per ounce, but varying with the quantity of silver present in the alloy operated on.

In England, where hydrochloric acid is a waste product of the alkali-works, and all apparatus is cheaper, the cost of refining by this method would be proportionally less. The fineness of the gold produced by this process varies from 991 to 997 in 1000 parts, the average, as found on a refinage of many thousand ounces, being 993.5, or 23 carats, 3⅜ grains. The remaining 6½ thousandths are silver; and this compares favorably with any of the previously known practical processess, none of which leave less silver than this in the resulting fine gold.

If the refined gold be subjected to a re-refinage by chlorine, the amount of silver left in it can be reduced to 0.2 per cent., just as in the refinage by the ordinary sulphuric acid process the same result can be obtained by subjecting the refined gold to a further refinage with bisulphate of potash. For practical working, however, this would probably never be attempted.

The silver resulting from this method of refining is tough, but its quality varies somewhat according to the gold originally operated on; if the alloy treated contains much copper, the greater part of this remains with the resulting silver, but the other metals are nearly all eliminated.

The fineness of the silver hitherto obtained has varied from 918.2 to 992.0 in 1000 parts, the average being 965.6. Analysis of the silver resulting from the refinage of gold known originally to have contained, amongst the base metals in the alloy, copper, lead, antimony, arsenic, and iron, gave the following results:—

Silver	972.3
Copper	25.0
Gold	2.7
Zinc and iron	traces
	1000.0

A very extended series of experiments have been made at the Sydney Branch of the Royal Mint to test the value of this process; and the result has been (as mentioned by the Hon. the Colonial Treasurer, in his speech on the Budget, October 14th, 1869), that "active steps are now being taken to bring the system into operation" into that establishment.

I have already, in the paper read before the Chemical Society, acknowledged the obligation I feel under to my brother officers, Mr. ROBERT HUNT and Dr. LEIBIUS, for their kind help and encouragement in perfecting this process of refining; but my especial thanks are also due to Professor SMITH, of the Sydney University, who, in the kindest manner, placed his laboratory at my disposal, to assist me in this matter, and also to Doctor THOMPSON and Mr. EDWARD HILL, for their valuable and friendly help.—*Chemical News.*

The Goderich Salt Region.

By T. STERRY HUNT, LL. D., F. R. S.

FROM the report of T. STERRY HUNT, LL. D., on the Goderich Salt Region, we condense the following: In 1866, near the town of Goderich, Ontario, Canada, a deposit of salt was discovered by boring, at a depth of one thousand feet below the surface. Soon after Dr. HUNT made a report on the subject, which may be found on pages 263-272 of the General Report of the Geological Survey of Canada. Since that time, encouraged by the results of the first undertaking, several other borings have been made in the vicinity, which are yielding similar brines. The presence of a stratum of rock-salt has been established by the grains of salt brought up by the sand-pump during the borings. In 1867 a well was sunk at Clifton, thirteen miles south-east of Goderich, to the depth of 1180 feet. A stratum of rock-salt, said to be sixteen feet thick, rewarded this undertaking. The greater depth of this well is easily accounted for by the south-east dip of the strata. The summit of the Onondaga formation, which appears on the surface at Goderich, is covered by about 200 feet of corniferous lime-stone at Clifton, which covers a broad triangular area, extending north-eastward from Goderich nearly forty miles, and bounded on the north-east and north-west by the outcrop of the underlying Onondaga formation. At Kincardine, thirty miles north-east of Goderich, in 1868, a stratum of rock-salt thirteen feet thick was pierced by a well 900 feet deep. At Goderich 775 feet of lime-stone were encountered, while at Kincardine only 508½ remain, the upper portion having been partially removed by erosion. It is not certain that the stratum originally had precisely the same thickness in the two localities, and hence the amount removed may appear somewhat greater or less than it really is. This and similar points can only be determined by careful examinations of future borings, for which purpose samples of the material, extracted at intervals of fifteen or twenty feet, should be carefully preserved.

The base of the Onondaga formation comes to the surface at the mouth of the Saugeen river. Here, at Southampton, an ill-advised attempt was made in 1868, in search of salt by boring. According to the record furnished me, the solid rock was only reached at a depth of 230 feet, after which 350 feet of white and gray limestone had been penetrated up to August 22, 1868. The subsequent record is incomplete, but beneath the limestones were encountered several hundred feet of red shales, and the boring was finally abandoned at a depth of 1251 feet from the surface. Another well also was sunk last year, at Port Elgin, five miles below Southampton, on the coast, and the boring in November last had attained a depth of 890 feet, and was still going on in the red shales. In this connection may be noticed a well which was sunk in 1867, at the village of Waterloo, about eighty miles to the south-east of Port Elgin, but in the same geological position, that is to say, near the base of the Onondaga formation, and was abandoned at the depth of 1120 feet; bitter saline waters were met with at depths of 800 and 900 feet, and were probably similar to the bitter water found at St. Catharine's at the same geological horizon. In the Report for 1866, on pages 271, 272, the waters of this class are noticed, and their unfitness for the manufacture of salt pointed out. The 77 feet of limestone, gypsum and shale in the Waterloo section belong to the base of the Onondaga, or salt-bearing series, beneath which no valuable brines have yet been found. The 340 feet of limestone underlying the shale, represent the Guelph, Niagara and Clinton formations, and the red and blue shales beneath these belong to the Medina formation. By referring to the account of a boring at Barton, near Hamilton, it will be seen that these shales have there a total thickness of about 600 feet. (Report for 1866, page 251.)

It will be noticed that the Onondaga formation, as shown in the borings of Goderich and its vicinity, consists of several hundred feet of limestone, chiefly magnesian, underlaid by two or three hundred feet of red and blue shales, which carry rock-salt at their base. These are succeeded, in descending order, by the magnesian limestones of the Guelph, Niagara and Clinton formations, which rest upon the red shales of the Medina, as seen in the Southampton and Waterloo borings. We have the following succession in going downwards:

1. Limestones of the Onondaga or Salina formation.
2. Red and blue shales of the same.

3. Limestones of the Guelph and Niagara formations.
4. Red and blue shales of the Medina formation.

On account of the resemblances in color between the upper and lower couples of the above series mistakes may easily occur, as at Southampton, where the strata of 3 and 4 were supposed to be those of 1 and 2. Such errors, which have caused the expenditure of considerable sums of money at Southampton, Port Elgin and Waterloo, would be avoided by a careful study of the distribution of the various geological formations of this region, as described in the Geology of Canada. The accuracy with which the limits of the various formations throughout this region were traced out by Mr. ALEXANDER MURRAY, has received repeated confirmation in the course of the various explorations for oil and salt which have been made within the past few years.

As regards the possible extent of the salt-bearing area now under consideration, I take the liberty of quoting the following passage from my Report for 1866, page 271: "With regard to the probabilities of obtaining salt wells by other borings in this region, it is to be remarked that the thickness of the deposit of salt traversed in the Goderich well may warrant us in expecting that its area may be considerable; though whether its greatest extent will be inland, or beneath the waters of the lake, can only be known by experiment. It has already been explained that salt deposits have been formed in basins, whose limits were determined by the geographical surface at the time; and it is worthy of remark, that both here and in New York the salt deposits are connected with a thickening of the Onondaga formation, which, in its thinner intermediate portion, is apparently almost destitute of salt; a fact suggesting former geographical depressions, in which the two-salt bearing portions of the formation may have been deposited. Although it would be unsafe to predict that this development of salt at the base of the Onondaga formation is so widely extended, its thickness at Tilsonburg, St. Mary's, London and Enniskillen is such that it seems probable that farther borings in these localities, where deep wells have already been sunk, may reach saliferous strata capable of yielding valuable brines."

In confirmation of the first portion of the above extract, we can now point to the existence of salt at Clinton, thirteen miles to the south-east, and at Kincardine, thirty miles north north-east of Goderich. These two stations are forty miles apart, and a line connecting them would pass about seven miles to the east of Goderich. It is therefore extremely probable that the whole region between Clinton and Kincardine will be found underlaid by salt, and may belong to a single basin, whose extent yet remains to be ascertained.

The success of the borings at Goderich and its vicinity has, as we have seen, led to the sinking of wells for brine below the salt-bearing horizon. At the same time, other trials have been made in the hope of reaching it, by boring through rocks overlying those of the Goderich region.

At Tilsonburg a boring showed the existence of the corniferous limestone directly beneath about forty feet of clay, while in another boring about two miles to the south-west, it was overlaid by a few feet of soft shales, probably marking the base of the Hamilton formation. The first boring at Tilsonburg, as mentioned in the report for 1866, was carried to a depth of 854 feet in the solid rock. Numerous specimens of the borings from the first 196 feet were of pure non-magnesian limestones, but below that depth similar limestones alternated with dolomite. The marls which occur at the base of the Onondaga formation were not met with in this boring, though the water from 854 feet was said to be strongly saline. I was informed by the proprietors, Messrs. HEBBARD & AVERY, that the well furnished, by pumping, a brine marking from 35° to 50° of the salometer, but I was not able to get any of the water, and the well was soon after abandoned, although the presence of so strong a brine would seem to show the proximity of a saliferous stratum.

In a boring at London, where the presence of the base of the Hamilton was marked by about twenty feet of gray shales, including a band of black pyroschist overlying the corniferous, 600 feet of hard rock were passed through before reaching soft magnesian marls, which were penetrated to the depth of seventy-five feet. Specimens of the borings from this well, and from another near by, carried 300 feet from the top of the corniferous, show that pure limestones are interstratified with the dolomites to a depth of 400 feet. At Tilsonburg a pure limestone was met with at 524 feet from the top.

At St. Mary's, 700 feet, and at Oil Springs, in Enniskillen, 595 feet of limestone and dolomite were penetrated without encountering shales; while in another well, near the last, soft shaly strata were met with at about 600 feet from the top of the corniferous limestone, there overlaid by the Hamilton shales. It thus appears that the united thickness of the corniferous formation and the solid limestones and dolomites which compose the upper part of the Onondaga formation, is about 600 feet in London and Enniskillen, and farther eastward, in Tilsonburg and St. Mary's, considerably greater; exceeding by an unknown amount, in these localities, 854 and 700 feet.

As the few observations which we as yet possess of the thickness of the corniferous limestone in this region, do not warrant us in assigning to it a thickness of over 200 feet, it is evident that at London and in Enniskillen the hard strata which form the upper portion of the Onondaga formation, and have at Goderich a thickness of not less than 775 feet, are greatly reduced in thickness, since the volume of the two united is only 600 feet. To the south-eastward, however, the augmented thickness of the Onondaga would appear, from the results of the borings at St. Mary's and Tilsonburg, to be maintained. The thickness of this formation is, however, known to be very variable; while at the Niagara river it is reduced to 300 feet, and is apparently destitute of salt, it augments to the eastward, in central New York, where it again attains a volume of from 700 to 1000 feet, being equal to that observed at Goderich, and becomes once more salt-bearing. The increased thickness of the formation in these two regions, connected with accumulations of salt at its base, would seem to point to ancient basins or geographical depressions in the surface of the underlying formation, in which were deposited these thicker portions.

Most of the details here given with regard to the thickness and character of the rocks in this region, are condensed from the observations collected in my Report for 1866, pp. 241-250. They are embodied in a paper by me entitled, "Notes on the Geology of South-western Ontario," and published in the *American Journal of Science* for November, 1868, parts of which have been reprinted, with some few changes, in the last three pages.

[TO BE CONTINUED.]

The Evaporating Capacity of Boilers Heated by Waste Heat from Puddling Furnaces.

By J. H. RADINGER.*

BOILERS exposed to the waste heat of puddling or boiling furnaces, evaporate much more water, in proportion to the heated surface, than those heated by common means.

To gain a positive basis for the necessary capacity of the feeding-pumps to the boilers of the new additions to the rolling-mills of Count HENKEL VON DONNERSMARK, near Vienna, I lately made, on invitation of the manager, observations on the amounts of evaporated water in older boilers with the above heating arrangement, for which purpose I proceeded as follows: The three boilers on which observations were to be made simultaneously, are arranged behind three re-heating furnaces standing side by side, in a straight line, between the slag-hole and the chimney. The masonry reaches in front up to a height equal to the horizontal diameter, and the boiler is inclined towards its back part four inches, while the line of the flue-bottom below remains horizontal. The circular front surface of the boilers is covered by a wall, in order to prevent the flame touching the joints and rivets of the plates. These three boilers, each of which is 22 feet (6.95 metres) long and 3½ feet (1.1 metres) in diameter, and which consequently possess a combined heating surface of 400 square feet (40 square metres), were all fed by one pump from a cast-iron reservoir, 30 inches in depth, the vertical walls of which surround a surface of water of 9.25 square feet. An inserted rule indicated the falling of the level during each feeding operation, and as, according to a simple calculation, one inch lowering of the level is equal to a volume of 0.77 cubic feet, the determination of the consumed quantity of water was easy and accurate.

To establish, at the same time, the useful effect of the feeding pump, (in order to enable the managers in the future to make such a measurement approximately, but in a much simpler manner), an apparatus recording the rotations was affixed to the shaft of the fly-wheel. And as the plunger has a diameter of 2 inches 5½ lines (65 m. m.), and a stroke of 8 inches 1½ lines, (215 m. m.), every hundred strokes of the plunger are equivalent to a theoretical space of 2½ cubic feet; 80 to 85 strokes were made per minute, which is equivalent to 2 feet (0.63 metres) velocity of plunger; the height of suction was in the mean 3½ feet (1.1 metre).

To ascertain, furthermore, the relations between the coal burnt and the water evaporated, for the purpose of comparison with other kinds of coal, we concluded to continue the experiment until the known contents of a coal wagon (170 zoll-centner, or 8,500 kilogrammes,) should be consumed by the three boilers. But our intentions, as far as the last-mentioned condition is concerned, had to be given up for two reasons: First, the feeding pump proved a little too weak, as it could not keep up a proper supply of water, because it had to be stopped every time during the refilling of the reservoir (the influx being continuous at ordinary times). On account of this circumstance, the three boilers contained, after 6¼ hours, 26 cubic feet less water than at the commencement of the experiment—a fact which could be established with sufficient accuracy by the water-gauges and accurate drawings of the boilers. In the second place, the experiment was necessarily limited by an accident, the breaking of a screw of the eccentric of the rolling machine, during the repairing of which the fires under the boiler had to be smothered. The remaining coal was weighed, and found to be 30 zoll-centner; the weight of the coal burnt (from Domboan, Upper Silesia,) was consequently 140 zoll-centner (7,000 kilogrammes).

With the burning of this coal and the determination of the water level, we commenced experiment No. 5 at 9:33 A. M. The first four observations were for the training of the workmen and the control of the apparatus. In experiment No. 1, for instance, a comparison of the water really introduced with the volume traversed by the plunger, showed the relation of 43:100, and by this discrepancy our attention was drawn to a small, almost invisible crack in an elbow of the suction-pipe, which permitted the entrance of air, and had therefore to be stopped. The indications of the hand attached to the rotation-counter must, of course, only be noticed from the time the pump catches water. If there is air in the suction-pipe, which is always the case after a stoppage for some time, the rising of the water inside can easily be followed with a hammer, a rap on the portion of the pipe containing water sounding entirely different from one on the part containing only air. And when the hand is held to the valve-box, after the water has filled the whole suction-pipe, the stroke, during which the valve falls the first time on its seat surrounded by water, can be distinctly recognized. This was always the first stroke counted.

I must also premise that the observations were intentionally made in the middle of the week, (Wednesday, September 15, 1869), when the masonry was at an average temperature; that the weather was clear, and the direction of the weak currents of wind was from the grate-bars to the chimney—a fact which facilitates considerably the draft and the maintenance of an even pressure of steam. The experiment lasted from 8:24 A. M. till 3:48 P. M., and as two shifts work through the week, there can be no doubt that the conditions under which we experimented, remained the same throughout. For these reasons, I am of opinion that the experiments lasted a sufficient length of time.

In the following abstract, from the record of experiments, the notes of secondary importance are omitted, and also the indications of the rule, manometer, etc. The temperature of the feed-water was nearly constantly at 10 degrees C., and the steam pressure oscillated between 3.5 and 4 atmospheres. The experiment proper lasted, without any interruption whatever of the observations (No. 5 to No. 24, inclusive,)—6 hours and 30 minutes.

No.	Time of feeding. from	to	Minutes.	Lowering of surface of water in reservoir. (Inches.)	Amount of water fed in cubic feet.	Number of strokes of pump.	Volume of space traversed by plunger. (Cubic feet.)	Useful effect of pump.
1*	8h.24m.	8h.36m.	12	12.5	9.60	1010	22.30	0.43
2	8h.56m.	9h.4m.	8	21.0	15.96	750	16.70	0.95
5†	9h.41m.	9h 50m.	9	22.0	17.10	830	18.50	0.94
10	11h.10m.	11h.20m.	10	22.0	16.72	800	17.84	0.94
15	12h.39m.	12h.49m.	10	23.5	17.86	860	19.20	0.93
20	1h.59m.	2h.11m.	12	22.0	16.72	870	19.40	0.86
24‡	3h.9m.	3h.18m.	9	24.0	18.24	900	20.07	0.91
	Time of observation, 6 hours 30 minutes.			428.5	340	16.680	372.6	0.91

Amount of water fed..... 340 cubic ft.
Difference between water fed and evaporated in the boilers..... 26 cubic ft.

Amount of evaporated water 366 cubic ft. (11.8 cubic met.) per 6.50 hours.
Amount of evaporated water 56.3 cubic ft. (1.81 cubic met.) per 1 hour.
Per 1 hour and 1 square foot, 0.14 cubic feet (8 lbs.)
Per 1 hour and 1 square meter, 45 KILOGRAMMES.

* The suction-pipe let in air, and was made air-tight.
† Commencement of water and coal notations at 9:33 A. M.
‡ End of notation of water and coal consumption at 3:48 P. M.

7,000 kilogrammes of coal were burned, the waste heat of which evaporated 11,800 kilogrammes of water, corresponding to 1.7 times their weight.

The evaporating capacity of these boilers at 45 kilogrammes per hour per square meter, is about twice as large as that of boilers having a fire-box of their own—the latter, as is well known, evaporating only 20 to 25 kilogrammes in the same time to the same surface. Nevertheless, the gases pass into the chimneys so hot that the latter have to be lined with fire-brick up to two-thirds of their height, and furthermore, the relative size of the grate to the heating surface is 1:9, while with the common boilers it varies from 1:18 to 1:36.

The 7,000 kilogrammes of coal burned evaporated, as has been said, 11,800 kilogrammes of water—1.7 times their weight. This proportion, it is true, would appear extremely unfavorable, if we did not have to take into consideration that we use here only waste heat, while the real object of the fires is the working of the reheating furnaces. The producing capacity of these furnaces is, moreover, enormously great in this establishment. The product of 30 rails daily per furnace is hardly reached by any other iron-works in Germany.

* NOTE.—Zeitschrift des Oesterreichischen Ingenieur and Architecten Vereins.

On the Estimation of Manganese in Spiegeleisen and Ferro-Manganese.

By THOMAS ROWAN, F.C.S.

THE following process for the determination of manganese is, I need hardly say, not novel; but having had occasion to make many estimations of manganese in spiegeleisen and ferro-manganese, I can recommend it as superior for speed and accuracy, where manganese in quantity has to be determined, to the other processes commonly resorted to.

A convenient quantity of the sample, say 20 grains, in as fine a state of division as possible, is digested in a long-necked flask, with about one and one-half ounces of hydrochloric acid, until complete solution is effected. The solution is then oxidized with chlorate of potash (KO, ClO_5, or $K\,ClO_3$) added from time to time, and finally boiled until traces of chlorine can no longer be detected.

The solution is now saturated by liquid carbonate of soda (NaO, CO_2, or $Na_2\,CO_3$) added in small successive quantities, the flask being well agitated after each addition of the alkali. On nearing the point of saturation, each addition of the carbonate of soda occasions the separation of small quantities of carbonate of iron and manganese, which disappear on the flask being shaken. When this is observed the alkali must be added with extreme caution, but the deep blood-red color now acquired by the solution will, after a little practice, be a sufficient indication to the operator that the desired point of saturation or neutralization has been attained. Or, if it is preferred, the smallest excess of carbonate of soda may be added, and the permanent precipitate which forms re-dissolved by the cautious addition of hydrochloric acid introduced, drop by drop.

Before treating with carbonate of soda, the solution should be evaporated to as small a bulk as possible, the presence of much free acid causing the expenditure of an unnecessary amount of alkali, and the violent effervescence caused by the escaping carbonic acid often entails loss by the projections of portions of the solution from the flask.

From six to eight ounces of water are now added and the iron precipitated as the basic acetate of iron, by the addition of a concentrated solution of acetate of soda (NaO, $C_4H_3O_3$, or $Na,\,C_3\,H_2\,O_2$.) If the solution has previously been successfully neutralized with carbonate of soda, the ferric acetate will at once make its appearance; but if that point has not been reached, the iron will only precipitate after boiling, and

then not completely, and the precipitate will be found to be so gelatinous as to cause much trouble by clogging the filter.

After the addition of the acetate of soda the flask and contents are briskly boiled for about twenty minutes, and then allowed to repose for a few minutes, that the acetate of iron may settle to the bottom of the flask, when the solution is carefully decanted from it on a filter. More water is then added to the flask, with a few drops of acetate of soda, boiled for five or six minutes, and again decanted from the precipitate. This is repeated a third time. The acetate of iron can then be thrown on the filter and washed with boiling water. The filtrate, with washings, is removed to a beaker and brought to a temperature of about 100° Fahrenheit, and a stream of chlorine gas passed through until a faint smell of that gas can be detected from the liquid. This is ascertained by stopping, from time to time, the passage of the chlorine, blowing from the surface of the liquid in the beaker the gas that may have lodged there, and then testing the smell. If chlorine can be detected the addition of the gas is finally discontinued. The beaker is now carefully covered and set aside in a moderately warm place for six hours. The precipitated binoxide of manganese ($Mn\ O_2$, or $Mn_2\ O_2$) is removed by filtration, and chlorine is again passed through the filtrate to ascertain whether all the manganese has been removed. When the precipitated manganese settles to the bottom of the beaker, if the liquid above is purple-colored it indicates that an excess of chlorine has been used, and that permanganic acid has been formed. This is easily remedied, as the permanganic acid is at once reduced to the binoxide by the presence of any organic matter. A few drops of alcohol may be added, and the precipitated binoxide of manganese filtered off.

The precipitated binoxide of manganese is re-dissolved by pouring hot dilute hydrochloric acid on the filter. The manganese is re-precipitated as carbonate by a solution of carbonate of soda, and boiled well to expel all carbonic acid, the carbonate of manganese being slightly soluble in carbonic acid. The carbonate of manganese is then collected on a filter, washed well with boiling water, dried, ignited, and weighed as the red oxide $Mn\ O_4$.

The binoxide of manganese has such a tendency to appropriate alkali that it cannot be directly ignited to the red oxide. When this is done without re-dissolving and re-precipitating as carbonate, I have found that one part of the ignited precipitate contains 0.0842 of alkali, which must be deducted from the weight before calculating the percentage of metallic manganese.

If the weight of the ignited red oxide thus obtained be three grains, the following calculation is made :

	Wt. of red oxide ppt.
1 : 0.0842 ::	3 : 2.7474.

In a rigorous analysis, however, it will be found more satisfactory to proceed as directed above, namely, re-dissolve the binoxide of manganese first obtained, and re-precipitate as carbonate before proceeding to ignite and weigh. The amount of metallic manganese is readily ascertained from the weight of the ignited red oxide, 100 parts of which contain 72.05 parts of metallic manganese.—*Engineering.*

MINING SUMMARY.

Idaho.

ITS CONDITION AND PROSPECTS.

THE present season is now so far advanced, says the Idaho *Statesman*, July 1, that we can take a survey of the field, and judge with reasonable certainty of the business of the year. For the benefit of our patrons at home and abroad, we will take a hasty glance at the condition of the territory, so that our prospects and status may be known. The mining results have, we think, fallen short of expectation. Water has been tolerably plenty in the Basin, but the returns, though fair, have not equalled the general expectation. The yield has no doubt exceeded that of the two last seasons; but owing to the abundance of snow, which had failed for those years, a better yield was anticipated than has been realized. Loon creek and the river mines of Middle Boise will no doubt come in to close the season prosperously, but we are prepared, from the best intelligence, to find them disappointing to some extent the hopes that have been indulged. The bar mining on Snake river will, toward fall, give employment at wages of from five to eight dollars per day for three or four hundred men. As these diggings commend their yield only after the water is gone in the Basin, they will aid much the prosperity of the year, and furnish fair wages for many who would otherwise be idle. In quartz mining there is nothing new. The Owyhee mills are running, and about two or three are sustaining their reputation by results. The general feeling is, however, that the maximum in yield has been reached in that camp. Alturas returns a meagre dividend from her mills, and will not exceed her former yield. Troubles and difficulties among mill owners are perhaps responsible for this stagnation, but there is no immediate evidence of any improvement. One new mill has just gone forward to the camp, but excepting the cost expended in its erection, nothing is to be expected from it this season. The Elkhorn mill, in Boise county, is doing nothing for its owners; and indeed none of the quartz property in Boise Basin will be of any profit this year, unless that of Lynch and Montre, at Granite creek, be an exception.

Generally, we think the results of mining in Idaho this year will be that the yield, though equal to that of the last two years, will disappoint expectations. And another year, unless the mining area is reinforced by new discoveries, we shall anticipate a falling off of mining population and mining enterprise. New fields of mining nearer the railroad and furnishing cheaper supplies, will drain our population and leave our own diggings to fewer hands, and showing, in all probability, diminishing results. To offset these results we have an excellent crop in prospect throughout the territory, and a general attention towards farming and stock raising, that is most encouraging. The grain, hay and vegetable crop of Boise and other agricultural districts is better than ever, and a confidence is felt among that portion of our community that has never existed before. As the placer mines decline, persons forsake them for the more permanent pursuits of farming and stock breeding, and in the end the country will undoubtedly be the gainer. Several droves of cattle for breeding are coming into the territory, one Smith, in the Raft River country, alone receiving an accession of three thousand head. Another has just started in the same region with fifteen hundred, and the Bruneau and Weiser Valleys are constantly receiving additions of settlers who propose to permanently engage in farming and raising stock.

In business, we have to record the usual summer stagnation. Among merchants times seem quite dull, and the impression prevails that a diminished demand will exist for goods. The fast flush times of former years, with reckless extravagance in the consumption of goods, have passed, and the general tendency toward economy shows an era of quiet, and that prudence in business has fairly begun. The mining towns show some business depression, which will unquestionably continue until the call for winter supplies shall again begin. In this city our merchants are doing a fair business, and there is some activity in business which imparts life to the community. The erection of the penitentiary, now under way, and the assay office, soon to begin, will give employment to a number of laborers and mechanics, and result in the diffusion of considerable money in business circles. On the whole, the Territory, though enjoying fair prosperity, may be considered as about holding its own—nothing more.

Colorado.

REVIEW OF MINING AFFAIRS.

A correspondent of the St. Louis *Journal of Commerce*, writing from Central City, July 5, says: As the season advances, mining matters assume their wonted lively aspect, and work is being generally resumed throughout the country. The stamp mills are rattling away merrily, and the gold product holds its own, notwithstanding a recent series of adverse circumstances peculiar to the mines. The shipment for May from Gilpin county amounted to $112,500 coin, against $116,000 for the same month in last year. But for the recent "drowning out" of the large Gregory companies, occasioned by the breaking of a pump, these figures would have been augmented by $20,000, which would have been a decided increase over last year. This stoppage, it is hoped, will prove only temporary; still the product gives evidence of a healthy state of affairs, showing activity in new quarters, as the figures all kept so nearly up to the mark without the aid of the properties mentioned, which were all actively at work at this time last year. This is owing to the change which is slowly but surely working here in the business of the country. Mining is generally being taken up as the permanent business, and is no longer looked upon as a means by which rapidly to accumulate fortunes. The excited, unsettled, over-sanguine masses who came to the country in its early days with this idea in view—mostly broken-down merchants and speculators, seeking by any means to restore their lost fortunes—have long since gone, and their places are filled by a steady, hard-working class of people, who have all their lives been used to making their bread underground, who do not expect any but hard-earned fortunes, and who intend making their homes in the mountains. Capital seeking investment here must no longer be deluded with the hope of fabulous gains; but if it is contented with 7 per cent. in New York, or 10 in St. Louis, it should surely be worth 20 in Colorado, which it can certainly realize if properly handled. But the common error has always been to regard Colorado investments as "speculation" merely; and the only men who now cry down the country are those who recklessly made them with that idea, and who, instead of realizing their expected one thousand per cent., have very naturally made nothing at all. Their mines are still in the same hopeful state of development as when they issued their glowing prospectuses, showing the fabulous amount of gold that was to be produced from the ore that was to be raised from the shaft that is now more thoroughly watered than ever was any stock that they ever issued on the strength of it. The agents that they sent out have long since departed, and the bar-rooms that once knew them know them no more forever. And the mills that they erected all over the country in 1864 and 1865 still stand, idle and useless, as monuments of their stupidity, ignorance and reckless extravagance. If the fortunes upon fortunes that were squandered in this way had been put in careful hands, to be used as capital would be in a systematized manufacturing business in the East, Colorado would now hold her proper position financially, a country for safe investment and profitable return, and that in a ratio far above any State in the Union. Take as a single instance of what I claim, the Grass Valley Gold Mining Company, now operating on mines owned by the Central Gold Mining Company, of New York, in which I believe some of your St. Louis men are interested. These mines were abandoned in disgust by the Central Company in 1864, because it was claimed they would not pay. The Grass Valley Company, however, obtained leases of the property last fall, and sent an agent out here in January, who, about the first of February, commenced work without a dollar, and who made the mine pay his expenses while developing and improving it, never drawing on the east for more money than he sent there in the shape of gold, his shipments constantly increasing, until this last month they amounted to $10,000; and now he has the mine in working condition, an engine and hoisting gear in position on the ground, these and all his other expenses paid by the mine itself, ore enough in sight to last six months, and a surety of a clear profit of $5,000 for the month of June. The Grass Valley stock consists of 100,000 shares, and the present quotation is twenty cents, which would make the capital of the company $20,000, on which (furnishing no working capital whatever) there will be realized for this month a clear net gain of 25 per cent. I speak advisedly of this. And what is true of this company can be made true of a hundred others. The trouble is to convince those who years ago were made innocent victims, and who have long since given up the hope of any return whatever upon their investments, that now, by proper management, their mines can be made to yield a really handsome profit, with the aid, in most cases, perhaps, of a little additional capital, for the purpose of putting their long-neglected properties in working condition. They look upon all our statements as to the prosperous condition of the country with suspicion, and as designed simply as fresh bait for them, and very naturally so, too, it must be confessed. They will not believe that any good thing can come out of Nazareth. It may take years, probably, for us to fully overcome this feeling against us. The best and most convincing proof we can give them of what we claim now is to work out our own salvation unaided, which we are gradually but certainly doing. One fact, however, which they constantly overlook, and which would go far toward convincing them of our truth and good faith, if they could be made to understand it, is the great change which has come over the country since 1864, in the matter of labor, material, and means and processes of working. These expenses have decreased fully two-thirds, while the currency value of gold has suffered a reduction of not more than one-sixth. An exhibit of this in detail would require an extended statement, which I will reserve for a future letter. FRISCO.

GEORGETOWN ITEMS.

We condense the following from the *Miner*: There is nothing new to report from the Terrible mine; the same steady yield of ore, and rich ore, too, characteristic of the mine, continues. A shipment of first-class ore will soon be made. Work on the Marshall tunnel is being actively pushed. The breast of the tunnel is rapidly approaching a "nest" of good lodes. The Morris tunnel, situated on Democrat mountain, is being driven ahead about ten feet per week. Some of the ore obtained from the lode lately crossed by the tunnel will, we understand, be removed for treatment. In this lode the pay streak, which was formerly on the south wall, has obeyed the law which seems to govern all the lodes in this vicinity and passed over to the north wall. A streak of exceedingly rich ore has been exposed to view in the "Mendota" mine. A good working force will be put upon the lode in a few days. This is one of the most available and valuable of the mining properties of the Georgetown lode.

Nevada.

CAVE IN THE YELLOW JACKET MINE.

OUR exchanges from Gold Hill, dated June 29th, give the following particulars: "About eight o'clock last evening, a small cave occurred in the Yellow Jacket mine, between the 800 and 900 feet levels. Four miners were killed. Their names were Manual Alameda, Patrick Doherty, John Kennedy, Ralph Hanson. The body of Hanson was recovered about one o'clock this morning. The other bodies can be seen, and will be recovered this afternoon, but, owing to the loose nature of the mass of ore and the timber, the workmen have to proceed slowly and cautiously. The cave occurred at the seventh and eighth floors, above the 900 feet level, and was caused by a flake of ore and vein matter falling from the hanging wall. Three sets of timbers in length, two in height, and two in width, constitute the entire cave. All around it is secure, and no further damage can be done.

LATER—GOLD HILL, June 20—7 P. M.—As soon as the cave occurred in the Yellow Jacket mine, several brave men from the floors below hurried up the ladders to the rescue, knowing full well that some of their comrades must be there, and in need of immediate help. The danger was great for the timbers were still cracking and pieces of ore falling; yet they ventured close to the ruins, and the light of their candles revealed one man jammed among the debris, and still alive. This man was Hanson. They could get near enough to touch him, and he was able to freely converse with them. A heavy timber across his hips and others about his legs, held him fast. Only one or two men could work in the narrow space at a time, and very cautiously, by reason of danger from the still moving mass. They worked with saw and axe, and for over two hours the poor fellow talked with them as they worked. He called for water, which they gave him three or four times. He was in great pain, but cool and sensible to the last. One of his comrades bade him keep up good spirits, and they would have him out shortly. "Ah, boys," said he, "good spirits is getting played out." Then, at times, in his agony, he would beg them to end his sufferings by splitting his head with the axe. At last, his voice could be heard no longer, and on examination he was found to be dead.

Superintendent Winters and James O'Donnell, foreman, were down in the mine nearly all night, directing operations and doing their best toward rescuing any possible survivor. The other three men remain beneath the *debris*, and portions of their bodies can be seen. They will probably be recovered this evening. All four of the victims were new hands, and, we believe, unmarried. They were from twenty to thirty-five years of age.

JULY 2—Work through out the mine is now progressing as usual, and the mine is looking excellently well in all the ore producing sections.

THE RENO STETEFELDT FURNACE.

The once famous Whiteman mine, situated three miles from Como, in Palmyra district, is now being worked with good success; 900 pounds of selected ore, worked at Reno by the Stetefeldt process, yielded an average of $228 per ton. The mine is now owned by Mr. Croker.

ANNUAL STATEMENT OF THE IMPERIAL EMPIRE COMPANY.

At the recent annual meeting of the Imperial Company, at San Francisco, the following Board of Trustees were elected for the ensuing year: A. K. P. Harmon, J. D. Fry, Thomas Bell, S. W. Glazier, Robert Sherwood, James Freeborn and Thomas Sunderland. At a subsequent meeting of the Board the following officers were elected: A. K. P. Harmon, President; J. D. Fry, Vice-President; D. A. Jennings, Secretary, and R. N. Graves, Superintendent. From the Secretary's annual report we condense the following report of receipts and disbursements for the year ending May 31, 1870:

RECEIPTS.

Gold Hill and Rock Point mills	$3,674 10
Holmes mine—Ore worked and sold	8,507 41
Alta mine—Ore worked, etc	171,976 60
Company note payable to Bank of California	24,000 00
Assessment No. 3	20,000 00
Assessment No. 4	40,000 00
Assessment No. 5	40,000 00
Assessment No. 6	40,000 00
Assessment No. 7 (on account)	1,740 63
Imperial Empire shaft	2,406 89
Sale of Rock Point and Lindaur mill	15,000 00
Miscellaneous	6,657 19
Cash on hand, May 31, 1870	7,680 16
Total	$379,642 98

DISBURSEMENTS.

Rock Point mill, supplies, etc	$3,295 58
Holmes mine	5,178 55
Discount on Gold Hill drafts	2,041 23
Virginia and Truckee Railroad	27,000 00
Legal expenses	6,035 05
New drifts	11,352 70
Alta mine, supplies, etc	96,756 03
Gold Hill mill, supplies, etc	98,989 28
General expenses	13,674 01
Imperial Empire shaft	83,945 63
Expenses in San Francisco	8,470 32
Miscellaneous	22,724 32
Cash on hand, May 31, 1870	181 00
Total	$379,642 98

The President, A. K. P. Harmon, remarks in his report: "The completion of the Virginia and Truckee Railway has called for the remainder of the $30,000 guaranteed by the company, and we have now that amount invested as a set-off to future liabilities for transportation. I anticipate much from the cheapening of railway carriage, and next year I trust the effect will be visible in our reports." The report of the Superintendent states: "I find it almost impossible to make an accurate estimate of ore yet remaining in the mine. No correct measurements can be taken, but I am safe in saying there remains 10,000 tons of ore that will assay from $16 to $18. In

a north drift run by the Alpha Company on the 1,100 level, last December, a narrow vein of ore (about 18 inches wide) was developed. Assays from this stratum range from $40 to $50 per ton. We have now raised it over fifty feet, working four men, and getting about four tons per day of very good ore."

Arizona.

FROM the Prescott (Arizona) *Miner*, of June 4th, we summarize the following: "The news from the mines in the Big Bug district continues good. Tuesday last a clean-up was made at the Big Bug mill, after a run of about eight days, with ten stamps, and the amount of gold saved exceeded $1,200. The mine is in good condition, and there is rock enough to keep the mill running several months. News from the Walnut Grove, Walker's and Martinez districts, is favorable, although no new developments of note have been made. In the Wickenburg d strict, the Vulture company's 40-stamp mill is engaged, as usual, adding to the wealth of the world. The Burro mines, some 300 miles from Prescott, in a south-easterly direction, are at present attracting a good deal of attention, and we are sorry that the last mail from the south brought us nothing new regarding them. The placers recently discovered in Pima county, this Territory, and which were at first pronounced immensely rich, have, it appears, disappointed many ardent individuals. There is no water near them, and they are not sufficiently rich to pay by the dry-washing process. The San Diego mines, and the Yellow Pine mines, on the other side of the Colorado, are, it is said, very promising."

ON DIT ABOUT MINES AND METALS.

The Australian Diamond Mine Company have up to this time, obtained 759 diamonds.

A Controlling Interest in the Reis quartz mine at Sierra Buttes, California, has been sold to an English company, at a price based on $750,000 as the aggregate value of the property.

Another Large Diamond.—According to the *Scientific Opinion* the diamond known as the "Star of South Africa," having been cut, has proved a matchless stone of most resplendent quality, of about 186 grains weight.

South African Gold Fields.—Mr. HUBNER, who was sent out by the Prussian Government to inspect the South African gold fields, reports that in his opinion the gold diggings at the Tatia will not prove remunerative.

A Rolling Mill in Pennsylvania has rolled out a finely polished sheet of iron three feet long and twelve inches wide, and weighing but three and a half ounces. It is thinner than ordinary paper.

Bullion from White Pine.—$40,000 a week is about the average amount of bullion shipped from Hamilton, W. P., Nevada. The total shipments for last month reached $132,977 21, against $119,-204 83 during the month of May.

Cleveland Rolling Mill Company.—The Cleveland Rolling Mill Company is producing steel rafts at the rate of 6,000 to 8,000 tons per year. The mill has only recently started, and is not yet in full operation. Its capacity is from 15,000 to 20,000 tons per year. The steel is of Lake Superior iron.

Missouri Lead Mines.—The reports from several lead-raining districts are such as warrant us in saying that the number of mines, and the quantity of lead produced this year will be largely in excess of last. Several parties who have recently engaged in mining and smelting are more than satisfied—really jubilant over their prospects and experience thus far.—*St. Louis Journal of Commerce.*

Pittsburgh Iron Mills.—The value of the annual products of the iron mills of Pittsbnrgh is estimated at $20,000,000. The actual sales of the past year, as exhibited by the United States Assessor's books, aggregated $16,708,389. This exhibit is made in a year in which the trade was depressed, the unsettled condition of the financial market and various other causes operating against it.

Working in Quicksand.—The sinking through the land and water at the Battersfield colliery, Bagilt, North Wales, by means of pneumatic power and diving-bell dresses, has been so far successful that the workmen have at last, at a depth of about thirty yards, got down to the solid stratum. The tubes have been taken out, and pumps for getting out the water are now being put down. Of the difficulties which have had to be encountered, some idea may be formed when it is stated that considerably more than a year was occupied in sinking to a depth of about twenty yards. The colliery will be about the largest in the kingdom, the shaft being no less than twenty feet clear in diameter.

How to Unload Gravel Cars.—A labor-saving contrivance for this purpose, now in use on the Southern Minnesota railroad, is thus described: "The invention consists of a mammoth double mould-board plow placed upon the rear car of the train, which, when loaded by the usual gang of men, is conducted to its destination, where by simply uncoupling the engine from the train and coupling it to the plough, which is done by means of a long cable that traverses the length of the train. The engineer whistles 'on breaks,' the engine and plough move forward, the train remains stationary, and the gravel is quickly and neatly discharged on the track. So one engine and set of men keep two trains of cars moving, or, in other words, do double the work formerly done with the same expense. On the occasion spoken of the conductor took a loaded train over half a mile, unloaded it, and returned to the pit in eleven minutes and a half, where he found the other train loaded and in readiness to move out."

Mexican Mines.—Mexico is probably the richest mineral country in the world, and its riches are by no means worked out as yet. A work on the "Mineral Resources of Mexico," by Mr. C. CHIPMAN, contains much of interest. "If one-half of the known silver lodes," says that gentleman, "were worked as they should be, by modern machinery and the skill which science and practice impart, the product of silver and gold would reach $1,000,000,000 annually, and would employ in various ways ten million people." The figures seem large, but he adduces facts to support them. Baron VON HUMBOLDT estimates the total yield of precious metals by Mexico at $4,218,243,840, from its discovery to the commencement of this century. The Veta Madre vein alone has yielded silver to the value of $225,000,000, and although traced for many miles, has been worked only for a length of about one and-a-half miles. Among other examples, the San Dumas mines gave over $2,000,000 for 24 years; the Pavillon divided among its shareholders over $6,000,000 per annum; the Sombrerite paid its shareholders $5,000,000 in seven months; the San Avario paid $54,000,000 in three years; the Gallego paid $11,000,000 in six years; and the Real del Monte Company has paid for years, and still pays, dividends averaging $1,500,000 per annum, notwithstanding heavy expenses, among which were some $150,000 yearly for drainage up to the end of 1868, when they completed the Aviadero adit, which is about four miles long, and which cost upwards of $500,000. With proper protection of life and property, enormous results may be still expected from this country.

SPECIAL SCIENTIFIC BREVITIES.

Captain Ericsson announces, in a communication to the American *Army and Navy Journal*, that he has perfected a system of submarine attack by which he can destroy the largest iron-clads ever built.

Velocity of Electric Waves.—Professor GOULD has found that the velocity of the electric waves through the Atlantic cables is from 7,000 to 8,000 miles per second, and depends somewhat upon whether the circuit is formed by the two cables or by one cable and the earth. Telegraph wires upon poles in the air conduct the waves with a velocity a little more than double this; and it is remarked, as a curious fact, that the rapidity of the transmission increases with the distance between the wire and the earth, or the height of the support. Wires buried in the earth likewise transmit slowly, like submarine cables. Wires upon poles but slightly elevated transmit signals with a velocity of 12,000 miles per second, while those at a considerable height give a velocity of 16,000 or 20,000 miles.

Test for the Quality of Glue.—Mr. ALFRED BIRD, has communicated to a recent number of the London *Chemical News* the following test for the quality of glue, which he states he has found very valuable: "Assuming that that is the best glue which will take up most water, take fifty grains of the specimen and dissolve it in three ounces of water in a water bath. When dissolved, set it by for twelve hours to gelatinise; and then take an ounce chip box, place it on the surface of the gelatine, and put shots into the box till it sinks down to a mark on the outside. It will be found that the stronger the glue the more shots it will take to sink the box down, so that the mark shall be level with the surface of the gelatine. In a trial with the finest glue I ever met with, fifty grains of glue, dissolved and gelatinised with three ounces of water, supported to the mark on the box, six ounces of shot, at a temperature of 58 deg. Fah. On trying the same experiment with best Russian isinglass, fifty grains, dissolved in three ounces of water, supported nine ounces of shot, the temperature being the same in each case."

Purifying Water.—RUNGE has made some observations on the purification of water, which offer some interesting points. Briefly put, his assertion is that metallic iron offers the readiest and simplest means of disinfecting water and of preserving it fresh. With his explanation we shall not now trouble ourselves, but we may say he accounts for the fact that Thames water taken to sea in iron tanks soon becomes perfectly sweet, and remains so through a long voyage. One observation he has made may be of interest to many readers at this time of the year. It is that a small piece of sheet-iron or some nails placed in the water in which cut flowers are put will keep the water sweet, and, we may suppose, the flowers fresh for a long time. RUNGE also put some iron filings in a vessel with a very small quantity of water, and placed a leech therein, and found the water quite fresh and the leech healthy after six months had passed. We may return to this subject, which has much interest in a sanitary point of view.

Improved Bunsen Battery.—The June number of the *Journal of the Franklin Institute* has the following from W. POOLE LEVISON: "In the spring of 1869, while making use of a small bichromate of potash battery, I discovered that the addition of nitric acid to the mixture of potassic bichromate and sulphuric acid, contained in its porous cups, conferred upon it the virtue of *steadiness*, without involving the evolution of annoying fumes. For over two months, during last summer, I had in almost constant action a combination of twenty-three large BUNSEN cells charged with dilute sulphuric acid and the triple mixture mentioned, and 'set up' openly upon the floor of my room. Not only did I work about it with perfect comfort, but left choice brass instruments in its immediate neighborhood with impunity. Its energy never fluctuated, but after remaining for some time steady, declined, precisely as if the electro-negative plates were bathed in nitric acid only. To a cooled mixture of potassic bichromate solution and sulphuric acid (perhaps preferable in atomic proportions) add *nitric* acid. The proportion of nitric acid may be greatly varied, as its office is merely to transfer oxygen."

Structure of Gas-flame.—The flame of a bat's wing or fish-tail burner is seen to consist of two distinct parts—one nearest the nipple of a light-blue color, sometimes nearly invisible, and a fringe of luminous flame above. The relative proportions of these two parts depend partly on the quality of the gas, but more on the construction of the burner. Small holes or a narrow slit will give more of the blue and less of the luminous part of the flame, all allowance being made for rate of burning and pressure. The constitution of the blue part has been made the subject of study by M. BAUDRIMONT. He finds in effect that it resembles somewhat the flame of a candle. He has not proved it to be hollow, but he shows that the outer part is intensely hot, and the inner part of a very much lower temperature. A small platinum wire carefully brought to the outer part became white-hot, and even began to melt. The same wire placed across the blue part of the flame remained dark in the middle, and was only made white-hot at the outer margins. M. BAUDRIMONT endeavored to estimate the exact temperature of the outer margin, but seems to have failed in the attempt.

Action of the Wind upon the Sails of Ships.—From a lecture delivered in Scotland by the Rev. JAMES N. MILLER, member of the Liverpool Polytechnic Society, we clip the following extract: "The relative direction and velocity of the wind on board the ship may be different from its actual direction and velocity, and that the former may be determined by trigonometrical calculation, if the latter, and also the speed of the ship, be known. The breadth, and, therefore, the force of the current of wind which strikes the sails, he said, varied as the sine of the angle which they made with it. The force exerted perpendicularly upon the sails was as the square of the sine of that angle. The force which the wind exerted in the direction of the ship's course was as the square of the sine of the same angle, multiplied by the sine of the angle at which the sails were set with reference to the course of the vessel. When the sails were so set that this product was the maximum the vessel attained its highest speed. With a wind before the beam a ship would sail faster if the sails were perfectly flat and set in the proper direction than if they had a belly. In the former case the maximum onward force was exerted upon the mills at every point of their surface. They also intercepted a wider, and therefore stronger, current of wind. The leeward force from the wind might be utilised in preventing the ship from turning either to windward or leeward, and also in steering it. The reason why a ship may sail as fast with a wind behind the beam as when it blows direct att is that the current of it which strikes the sails is stronger, because it both impinges upon a wider expanse of canvass, and also overtakes the sails with greater velocity. The lifting effect of some sails was owing to part of the force exerted upon them being resolvable upwards in a vertical direction, while the depressing effect from the sails, when the vessel lay over to a side, arose from part of the force of the wind being resolvable downwards in an opposite direction."

MISCELLANEA.

Arizona Mines in 1870.—The yield of the Arizona mines this year is estimated at $2,000,000, or about double that of 1869.

Burro Mines.—The Central route, *via* San Bernardino, is claimed to be the shortest and best to the Burro mines from San Francisco. The distance from Los Angelos by this route is 794 miles.

Columbus' Statue.—The Empress of the French has commemorated the great benefactor of the Spanish race, Christoval Columbus, or Colon, by despatching a statue of him to the city named after him as Colon, on the Isthmus, but called Aspinwall. Her majesty hopes this memorial will meet the gaze of travellers of all nations.

Setting Telegraph Poles.—At present they are setting telegraph poles in England by filling the space around the pole with gravel, with which are mingled scrap iron, turnings, and wire clippings. The oxydation of the iron results in the conglomoration of the gravel, which thus forms a hard mass that adds greatly to the rigidity of the foundation.

Sharpening Steel and Iron Wires by Electricity.—A German telegraph operator has discovered a mode of sharpening, with mathematical accuracy, any number of steel or iron wires, by the agency of the magnetic current. The discovery may be applied to the manufacture of pins and needles, and do away with the present process of grinding the points, so injurious and extensively fatal to the workmen.

The Income of the Government.—The total receipts of the Government since its organization, March 4, 1789, to June 30, 1869—a period of eighty years—from all sources, were $11,402,000,000, and the expenditures, $11,250,000,000. A statement is being prepared at the Treasury Department which will show the quarterly receipts and expenditures of the Government from January, 1861, to June 30, 1870, all disbursements on account of the war, etc.

United States Revenue.—The revenue of the United States for the year ending June 30th, was $388,000,000, of which $188,000,000 was derived from internal revenue duties, 170,000,000 from customs, in gold, and $30,000,000 from miscellaneous sources. The annual obligations of the government do not exceed $259,000,000; it is therefore contended by some of the leading journals, that a large permanent reduction ought to be made in the taxes at once.

New Coinage.—Specimens of new silver coinage have been struck at the United Siates Mint in Philadelphia—of the denominations of 10, 25 and 50 cents. Three different specimens of each of these denominations have been submitted to the Treasury Department for approval. The standard value of the new coin is reduced so as to correspond in actual value with the present "currency," with a view to its *immediate* use, instead of the 10, 25 and 50 cent notes.

Children in Factories.—The employment of children in manufactories in France is engaging the attention of the authorities, and the Council of State has, it is reported, agreed upon a draft of a law upon this subject to be presented to the Corps Legislatif. The bill prohibits masters from employing children under 8 years of age. Children between 8 and 13 cannot work over 6 hours a day, and children from 13 to 16 years of age may work 9 hours, but not longer. A heavy fine is imposed for all violations of the law.

Warming Railroad Carriages.—A new method of warming first-class carriages in express trains has been adopted in Bavaria. A special van is attached to the train, and contains a powerful "calorifere," and the heated air is conveyed to all the carriages of the train by means of india-rubber tubes. The experiment with first-class carriages is reported upon so favorably that the authorities have determined to apply it to all the carriages on the Bavarian lines, and it is expected that it will soon be adopted on all the German railways.

Another Mastadon.—A correspondent of the Stockton, California, *Independent*, from Knight's Ferry, states that a wonderful discovery has been made on Dry Creek in the shape of some huge mastadon, far exceeding in size anything yet discovered in the world. "When the writer saw the men at work unearthing the monster, yesterday, eight feet of one of the tusks had been uncovered; and at that distance it was about inches in diameter, and supposed to be twelve or fourteen fest in length. It measures four feet between the eyes."

Miss Maria Mitchell upon whom Vassar College has just conferred the Degree of Philosophy, is Professor of Astronomy in that institution. Miss MITCHELL is a native of Nantucket, and the daughter of the late WILLIAM MITCHELL, for many years President of the Nantucket Pacific Bank. The family is of Quaker origin, and Mr. MITCHELL, as well as his daughter, was far advanced in astronomical studies. They had an observatory for many years on the roof of the bank, and it was from that observatory that Miss MITCHELL discovered a comet for which she received medals from various learned societies both here and in Europe.

Railroad Torpedoes.—The Philadelphia and Reading Railroad Company use on an average 35,000 torpedoes annually on their numerous roads. These explosives are called "fog signals," and are used in heavy weather, when the signal lights on the towers cannot be seen from the engine. They are intended to prevent accidents, and have done good service in that respect since their introduction. To make them thoroughly effective, three are placed on the track a short distance apart, so that if one should fail to make a report, two would remain to perform that service. The explosion of a torpedo under the wheels of an engine is a warning of impending danger, and the engineer always stops the train in obedience to it.

Prevent the Decay of Wood.—An English journal gives the following: "A process has been discovered for the prevention of the decay of wood. As the result of a five years' experience, a paint is recommended, which at the same time possesses the advantages of being impervious to water. It is composed of fifty parts of tar, five hundred parts of fine white sand, four parts of linseed oil, one part of the red oxide of copper in its native state, and finally, one part of sulphuric acid. In order to manufacture the paint from this multiplicity of materials, the tar, chalk, sand and oil, are first heated in an iron kettle; the oxide and acid are then added with a great deal of caution. The mass is very carefully mixed and applied while hot. When thoroughly dry, this paint is as hard as stone."

The Pacific Mail Company.—There is no doubt that in due time the travel and traffic between New York and San Francisco will be absorbed by the great trans-continental railroad lines, and that the Isthmus route will be comparatively abandoned, at least until water communication is established by means of a Darien Canal. The Pacific Mail Steamship Company report that the Panama business is not paying, and that four of their splendid steamers have already been tranferred to the China trade. The Company owns twenty-four first class steamers, valued at nearly $12,000,000, and as fast as new paying routes are developed they will be put upon them. For the present, it is to be hoped that a reduced line will be maintained upon the old water route, if only by way of keeping up a healthy competition to the Pacific Railroad.—*New York Times, June* 14.

MARKET REVIEW.

The Coal Trade.

NEW YORK, July 15, 1870.

WHOLESALE.—The coal market has not assumed any new position since our last writing. There is a first-rate demand for coal, and all qualities and kinds are readily taken upon arrival, at our quotations; a few stray lots bring a little higher figure. The prices ruling now will probably remain in vogue during the next six weeks, unless some unforeseen accident occurs to stop the usual weekly production. Coal is as high now, in our opinion, as it should be. Dealers should look for that natural fluctuation in coal that we find in any other article of commerce. There are "bulls and bears" in coal as well as in gold; corners are formed also, as in flour and grain. The careful merchant will, however, be able to discern these "rocks ahead," and navigate his vessel to a safe harbor. There is a certain class of men who make a living out of the coal trade here in New York, only in proportion to the excitement and fluctuations they cause in the market. These fellows make their money out of the negligent business man, one who fails to take a newspaper, and hence does not keep posted in the trade. We make these remarks merely as a warning, and that our readers may not be alarmed at any little disturbance in trade that may occur, but wait a word from us before taking action.

The Schuylkill miners are yet out, but for the reasons stated last week, their idleness has had no bad effect in this market. The large companies here are one and all very much obliged to them for thus aiding them in paying big dividends, and no doubt hope that the Schuylkill men will "keep struck" eternally.

No news has reached us at our time of writing as to whether the threatened strike on the "eight-hour law" throughout the entire regions, noticed first in these columns last week, was inaugurated to-day or not. We have no fears, however, that such will be the case, and see no reason to change our ideas on this point from those expressed last week.

The Vessel Owners' Association have made a perfect "fizzle" of their endeavor to crowd upon dealers here their "infamous bill of lading," as it has been styled. New York does not mean to have her trade compromised by any such humbug as this, and we are heartily glad of it. Good-bye, Vessel Owners' Association!

Our friends of the Pennsylvania Coal Company, who often "rile" our temper very much, take exception to the remarks we indulged in two weeks ago in regard to their "July circular." They acknowledge that they have "no coal for sale" at those prices, but insist that they did sell to that "secret few" (contractors they call them) some coal which they are to deliver during this month. No doubt they have a few particular customers who are able to get Pittston coal at these low prices; but the point we argue is, that inasmuch as the public is not free to become purchasers, these rates should not be taken as any criterion, and the market should not be governed in the least by them.

FREIGHTS.—Vessels are coming in more rapidly, and plenty are to be had. There is no advance or decline to be noted.

RETAIL.—There has been a fair business done during the past week. Prices range from $5 50 to $6 50 for Pittston and similar coals. Lehigh and the better qualities are selling at from $7 to $7 50.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 9, 1870, compared with week ending July 10, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	74,792	1,497,223	29,490	1,165,632
Schuylkill Canal	18,502	251,096	3,908	49,038
Lehigh Valley R. R.	49,161	1,062,942	36,736	1,648,069
Lehigh & Sus. R. R.	14,467	342,406	12,471	507,807
Lehigh Canal	17,489	203,164	13,866	223,270
Scranton North	6	207,062	12,771	348,756
" South	2,463	600,639	26,948	921,994
Penn. Coal Co., rail	19,639	489,448	20,124	578,367
" " " canal	598	7,725	357	7,764
Del. & Hud. Canal Co.	19,441	549,432	34,406	631,465
" " R. R.	131	98,562	6,045	245,511
" " south	....	49,014	9,247	227,454
Shamokin	7,496	166,083	10,587	175,300
Trevorton	1,124	8,622	1,620	44,076
Lykens Valley Coal Co.	1,585	31,282	2,352	44,414
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	....	....	5,881	155,317
Williamstown, Col'y	3,866	75,844	4,553	144,474
Short Mountain	....	49,312	....	....
Total	230,763	5,689,855	236,762	7,168,708
1869	....	....	230,763	5,689,855
Increase week and year	....	....	5,999	1,478,853

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending July 9, 1870, compared with week ending July 10, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	19,243	477,749	16,674	426 007
C. & O. Canal	14,820	253,605	13,159	243,909
H. & B. T. R. R.	5,076	176,530	4,057	160,048
Harrisburg & D.	....	....	11,982	403,616
L. V. R. R.	....	552	....	8,229
P. & N.Y.C. & R. Co.	....	....	5,201	123,863
	39,139	908,436	51,073	1,365,672

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending July 9, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons cwt.	WEEK, 1869. tons cwt.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	19758 19	19073 15	892077 00	311060 17
Upper Lehigh Region	2401 04	2382 16	67863 00	59431 11
Mahanoy Region	88 16		564 00	974 13
Hazleton Region	8940 12	2658 10	111124 06	55497 05
Beaver Meadow Region	4335 06	2604 12	52035 16	29067 01
Mauch Chunk Region	382 18	5880 15	30670 10	124929 16
Totals	35907 15	32540 08	854254 12	580961 23
Increase	3367 07		273293 09	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	12871 08	14467 18	607807 13	342406 10
Forwarded East of Mch Chunk by Canal	19866 00	17489 15	223270 03	209164 19
Delivered at and above Mauch Chunk	737 19	582 15	21008 19	16550 05
Delivered to L. & B. R. R. at Plymouth Bridge	3432 08		102167 17	13688 06
L. V. R. R. at Sugar N.				5151 03
Totals	35908 15	32540 08	854254 12	580961 03
Of the above there was from Mines controlled by Co., W.B.C. & I.Co	16347 12	12117 04	261355 06	164368 10
L. C. & N. Co	382 18	6559 17	47224 07	139151 05
Totals	10730 10	18677 01	308879 13	303519 15
Increase			5059 18	
Decrease	7964 11			

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending July 7, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	29,490 15
Previously this year	1,136,142 02
Total	1,165,632 17
Same time last year	1,497,223 00
Decrease	331,590 03
Amount sent same week 1869	74,792 00

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, July 7, 1870:

From St. Clair	5,868 02
" Port Carbon	2,489 05
" Pottsville	233 12
" Schuylkill Haven	14,815 12
" Auburn	1,112 08
" Norristown	
" Port Clinton	2,721 04
" Allentown and Alburtis	2,230 07
" Harrisburgh and Dauphin	11,982 15
Total paying freight	41,473 10
Coal for Company's use	766 09
Total for week	42,238 19
Previously this year	1,534,670 00
Total	1,576,909 19
To same time last year	1,774,533 00

Report of coal transported over the Schuylkill Canal for the week ending Thursday, July 7, 1870.

	Tons. Cwt.
From Port Carbon	2,063 00
" Pottsville	156 00
" Schuylkill Haven	1,589 07
" Port Clinton	100 00
Total for week	3,908 07
Previously this year	45,130 09
Total	49,038 16
To same time last year	251,095 15

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending July 7, 1870:

	Tons.
For week	11,982 15
Previously this year	391,631 12
Total,	403,614 07

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, July 9, 1870.

	WEEK.	SEASON.
North	31,615 11	1,174,802 13
South	9,247 01	227,454 01
Total	40,862 12	1,402,256 14
Corresponding time in 1869.		
North	2,169 08	710,003 14
South	.....	47,297 09
Total	2,169 08	757,301 03
Increase North	29,446 03	Increase 464,798 19
Increase South	9,247 01	Increase 180,156 12
Total Increase	38,693 04	Increase 644,955 11

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending July 9, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,881 13	149,435 16	155,317 09
Bituminous	5,201 00	118,662 00	123,863 00
Total, Ant. and Bit.	11,082 13	268,097 16	279,180 09

Report of Coal Transported over Lehigh Valley Railroad

For the week ending July 9, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	9,065 19	357,521 18	366,587 17
" Hazleton	30,163 10	1,078,073 04	1,108,236 14
" Upper Lehigh	250 18	7,365 12	7,616 10
" Beaver Meadow	14,922 18	378,800 18	393,723 16
" Mahanoy	2,344 02	125,914 13	128,258 15
" Mauch Chunk		447 17	447 17
Total Anthracite	56,747 07	1,948,124 02	2,004,871 09
Bituminous Coal recv'd from Cats. R. R.			
N. C. R. R.			
E. P. R. R.		8,229 00	8,229 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	56,747 07	1,956,353 02	2,013,100 09
Same time last year	54,972 13	1,137,314 05	1,192,286 18
Increase	1,774 14	819,038 17	820,813 11
Decrease			
Forwarded East from M'h Chunk by rail	36,736 19	1,611,332 05	1,648,069 04
Same time last year	49,161 13	1,013,780 16	1,062,942 09
Increase	12,424 14	597,551 09	585,126 15
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	36,736 19	1,611,332 05	1,648,069 04
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	5,876 10	149,009 17	154,886 07
To L. & S. R. R. at Packerton for rail	167 08	4,226 17	4,393 05
Delivered at M'h Chunk	41 13	695 05	736 18
Delivered on line of road above Mauch Chunk	126 17	7,199 00	7,325 17
Delivered above M. Chunk for use of L. V. R. R.	879 01	30,339 16	31,218 17
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	8,660 05	97,630 06	106,290 11
At M. Chunk for canal	4,258 14	47,576 16	51,835 10
Total Anthracite	56,747 07	1,948,124 02	2,004,871 09
Bituminous Coal		8,229 00	8,229 00
Total all kinds	56,747 07	1,956,353 02	2,013,100 09

Shipments of Cumberland Coal

for the week ending Saturday, July 9, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	1,811 04	2,110 06	3,921 10
Consolidation	3,328 17	2,937 05	6,266 02
Spring Hill	352 09	.....	352 09
Midlothian	30 13	103 03	133 16
H. and Baltimore	....	1,250 06	1,250 06
do Va M	1,093 04	.....	1,093 03
V C & I Co	763 13	.....	763 13
G. C. C. and I.	1,316 01	350 05	1,666 06
Maryland	5,153 06	2,806 17	7,960 03
American	3,591 07	1,354 07	4,945 14
Atlantic	394 04	.....	394 04
Piedmont	1,006 00	.....	1,006 00
Swanton	878 06	.....	878 06
Barton	384 00	.....	384 00
Potomac	1,446 00	.....	1,446 00
Franklin	1,723 16	.....	1,723 16
Big Vein	1,608 05	.....	1,608 05
Total week	24,881 05	10,912 09	35,793 14
Previous	451,994 12	277,268 10	729,258 02
Total year	476,875 17	288,175 19	765,051 16

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, June 25, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	13,159 00	16,674 06	29,833 06
1869	14,820 17	19,243 08	34,064 05
Increase			
Decrease	1,661 17	2,569 02	4,230 19

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	243,909 09	426,007 09	669,916 18
1869	253,605 02	477,749 07	731,354 09
Increase			
Decrease	9,695 13	51,741 18	61,437 11

Statement of coal transported over the Eckhart Branch Railroad, during the week ending Saturday, July 9, 1870, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	2,326 18	1,766 13	4,103 81
1869	2,012 17	1,948 09	3,961 06
Increase	314 01		142 05
Decrease		181 16	

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	48,849 19	51,097 00	99,946 19
1869	30,337 02	47,428 02	77,765 04
Increase	18,512 17	3,668 18	22,181 15
Decrease			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, July 15.		AT PHILADELPHIA, July 14.	
SCHUYLKILL.	R. A.	W. A.	R. A.	W. A.
Lump	$- —	$5 00	4 50	— —
Steamer	— —	5 00	— —	— —
Broken	— —	5 25	— —	4 25 to 4 40
Egg	5 75 to 6 25	5 25	— —	4 25 to 4 40
Stove	— to —	5 75	— —	4 25 to 4 40
Chestnut	4 50 to 5 40	4 75	— —	4 00 to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	6 00	— —	— —	— —
Broken	5 75	— —	— —	— —
Egg	5 60	— —	— —	— —
Stove	6 00	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*	R. A.			
Diamond Vein	— —		— —	— —
New England	— —		— —	— —
Locust Dale	W. A.		— —	— —
Honey Brook, Le'h	W. A.	5 25 to 5 00	— —	— —
Spring Mountain	" "	5 25 to 5 00	— —	— —
Sugar Creek	" "	5 25 to 5 00	— —	— —
Sugar Loaf	" "	5 25 to 5 00	— —	— —
Old Comp'y's	" "	5 25 to 5 00	— —	— —
Cross Creek	" "	5 25 to 5 00	— —	— —
Enterprise	" "	— —	— —	— —
Girardville	" "	— —	— —	— —
McMichael	" "	— —	— —	— —
Shamokin	" "	5 50	4 50	— —
Lykens Valley	" "	— —	— —	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 50	— —
Henry Clay	" "	— —	4 50	— —
Powelton	" "	5 50	4 50	— —

(*Dealers in these coals may be found in our advertising columns.)

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 50	$3 50	$3 50	$3 75	$3 00
Wilkesbarre	3 00	3 50	3 50	3 50	3 75	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein	f.o.b. at Phila.					$5 00
" Lemon	"	"	"	"	"	4 75
Cumberland Vein Coal						5 00
Cumberland C. & I. Co.'s on board					N. Y.	7 00
Maryland Coal Co.	"				"	7 00
Consolidated Coal Co.'s	"				"	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port						
Pittston at Newburgh	4 30	4 50	4 50	4 60	5 10	4 20
Lackawana at Rondout	4 60	4 70	4 80	5 00	5 25	4 60
*Wilk'b're at Hoboken	4 65	4 75	5 00	5 25	5 50	4 60
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	5 50	5 25	5 25	5 25	5 50	4 75

For freights to different points, see "Freights."
* 25c. advance alongside.

Prices at Baltimore—July, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Zerba Valley	25 5@— —
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@5 50

Prices at Georget'n, D.C., & Alexandria, Va.

July, 1870.

George's Creek and Cumberland f. o. b. for shipping	$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$- —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

July, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.
Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@- 75
Gowrie	1 75	@- 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 75	@- 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack. Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@- —
Despard Coal Co	$7 50	@- —
Penn	— —	@- —
Newburg Orrel Gas	— —	@- —
West Fairmount Gas Coal	8 00	@- —

AT PHILADELPHIA.

Powelton $7 80

Prices of Foreign Coals.

July, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 00

From Port Carbon, 8 cents per ton more.
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 12
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 28

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
R. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses,	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight, Towing	1 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " / Freight	2 01
For re-shipment	2 40
	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,05
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

TO BOSTON.

Sydney	$— —
Lingan	— —
Cow Bay	— —
Port Caledonia	— —
Little Glace Bay	— —

Freights.—JULY, 1870.

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnston.	From Newburg	From Rondout
Amesbury	$2 75	$- —	$ 1 60	$
Bangor	2 75	— —	4 75	
Bath	2 00	2 00	1 60	5 00
Boston	2 00	1 60	2 00	1 75
Bridgeport	1 60	1 00	1 10	1 20
Bristol	2 00	1 25	1 40	
Cambridgeport	2 80	2 00		
Derby	2 00	— —		
Highton	1 85		1 45	
East Cambridge	2 50	2 00		5 00
Fall River	1 75	1 25	1 40	
Hackensack	1 95	1 50		
Hartford	2 75	1 35		
Jersey City	1 75	50		
Middletown	— —	1 25		
Mystic	1 75	1 25	1 30	
New Bedford	1 75	1 40		
Newburyport	2 15	2 00		
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 15	1 25	1 30
Newport	1 75	1 25	1 40	
New York	1 25	50	70	
Norwalk	1 70	1 00	1 05	
Norwich and tow	1 70	1 35	1 35	1 40
Pawtucket	1 90	1 50	1 60	
Portland	2 00	1 75		
Portsmouth, N. H.	2 00	2 25		1 85
Providence	1 75	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 30	2 10		
Sag Harbor	2 00	1 40	1 30	
Salem	2 00	1 60		1 75
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 75	2 00		
Warren	— —	1 40	1 45	
Washington	1 10			
TO RIVER PORTS.				
Albany		90	60	
Catskill		— —	50	
Cocksackie		— —	50	
Coeyman's		— —	75	
Cold Spring		— —	35	
Fishkill		— —	30	
Haverstraw		50	60	
Hudson		— —	50	
New York		— —	70	
Nyack		50	60	
Poughkeepsie		— —	35	
Rhinebeck		— —	30	
Rondout		— —	— —	
Saugerties		— —	40	
Sing Sing		— —	75	
Stuyvesant		— —	55	
Tarrytown		80	75	
Troy		90	75	
West Point		— —	35	
Yonkers		40	60	

Foreign and Provincial Freights.

July, 1870.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons.....£14 00@£16 00
Liverpool.....12s.6d@14. ton

TO NEW YORK.

Provincial

Sidney.....$—
Lingan.....—
Cow Bay.....—
Port Caledonia.....—
Little Glace Bay.....—

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven,	$ 40
Bridgeport,	40
Southport,	40
Westport,	40
Norwalk,	40
Stamford,	40
	Per Boat.
Greenwich,	$70 00
Port Chester,	80 00
Mamaroneck,	70 00
Glen Cove,	
New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	30 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.	Per Ton.
To Manhattanville,	8 cents.
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Oroton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	23 "
Boats of 100 Tons	*Per Boat.*
To Manhattanville, and Return,	$11 00
Spuyten Duyvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, July 15, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	32 00@35 00
Pig, American, No. 1	32 00@33 —
Pig, American, No. 2	30 —@31 —
Pig, American, Forge	29 —@30 —
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ℔ ct	— —@ 1 10
Bar, Refined, " "	75 —@ 77 50
Bar, Common, " "	72 50@ — —
Scroll, " "	87 50@115 —
Ovals and half-round, " "	95 —@110 —
Band, " "	95 —@ — —
Horse Shoe, " "	95 —@ — —
Rods, ⅝ to 3-16 inch, " "	85 —@120 —
Hoop, " "	105 —@145 —
Nail rod, less 5 ℔ ct	— 7 @— 7½
Sheet, Russia, as to Nos. (gold)	— 11@—11½
Sheet, Single, D, and T. Common	— 4¾@— 5¾
Sheet, Galv'd, Nos. 14 to 25 12 and 14 c. 25@30 ℔c. off	
Rails, English (gold), ℔ ton	59 00 @60 00
Rails, American, at Works in Pa	71 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb	— 15	@— 18
English Spring (2d and 1st quality)	— 7	@— 10
English Blister (2d and 1st quality)	— 10	@— 17
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— —	@— 18
American, Spring, do.	— 9	@— 11
American Machinery, do.	— —	@— 12
American German, do.	— 9	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— 17
Copper, Chili Pig	— @— —
Copper, American Ingot	19¾@— 20¼
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2¼ cents ℔ lb.

Galena, ℔ 100 lbs	$— @— —
Spanish (gold)	6 20 @6 25
German, do.	6 20 @6 40
English, do.	6 20 @6 45
Bar (net)	— — @7 37½
Pipe and Sheet (net)	— — @7 25

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	— @39
Straits	— @38¼
English	34¼@34½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 75 @9 —	$10 00 @10 50
I. C. Coke	7 — @7 75	8 25 @ 9 25
Coke Terne	6 — @6 25	7 25 @ 7 75
Charcoal Terne	7 75 @8 25	9 — @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100

	Gold.
Plates, Foreign, ℔ 100 lbs.	$6 0 @6 25 0
Plates, Domestic, ℔ lb.	@— 11 7

REMARKS.

IRON.—The demand for Scotch Pig has been very light, and prices are barely supported; 100 tons Eglinton sold at $3 50. American is inactive, and prices are about as previously noted, with but a sale of No. 1 Thomas at $33. Rails have been in active request, and, as the supply is light, prices are very firm; 3,000 tons American sold at $70, cash, at the mill. Bar continues dull, but the stock is light, and consists mostly of English. Plough sides Swedes, 6 @ 12 inch, continue very scarce, and 6, 7 and 8 inch are not to be had; what sizes there are, are held at $120 per ton, currency. Russia Sheet continues quiet.

COPPER.—New Sheathing is steady at 30 cents, and Yellow Metal 24 cents, cash. Ingot is still very dull, and the tendency of prices is rather in buyers' favor. The increase in the production of the world seems to run much ahead of the increase in the consumption. The large substitution of iron vessels for wooden ones, and the depression in the general shipping interest, not only here, but abroad, tends to a very considerable extent to lessen the demand for manufactured Copper, formerly so large for ship building and sheathing purposes. We have only to notice sales of 150,000 lbs. at 20½ cents for Lake Superior, and 20 for Baltimore.

SPELTER—Is in very limited demand, but owing o an advance in Europe, the market has more tone than before. Stolberg may be quoted at 6½ cents, gold, and Silesian 6¼ @ 6¼c.; 25 tons of the latter sold, to arrive, on private terms. Missouri is steady at 7 cents, currency.

LEAD.—The demand for Foreign Pig continues very limited, and we hear of none but jobbing sales; the stock, however, is firmly held at $6 20 @ $6 25, gold, for ordinary Foreign; Bar 7¼ cents, and Sheet and Pipe 7¼c., net cash.

TIN.—Straits Pig is steady and firm, but English is lower, and we reduce our quotation to 34¼ @ 34½ cents, gold. Banca is dull at 39 cents. Sales have been made of 300 slabs Straits, in lots, at 38 @ 38½ cents, gold, and 10 tons English at a reserved price. Plates are in moderate demand at firm prices; the sales are 1,100 bxs. Assorted Charcoal Tin at $8 75 @ $9, gold.

STEEL.—There is a good stock in store, and the demand is moderate at our quotations.

ZINC.—Sheet is quiet and steady at previous quotations.

ZINC.—American Ox. Zinc, 6½ @ 7c.; French do., 9 @ 9¼c.

MANGANESE—4 @ 4½c.

Mining Stocks.

NEW YORK, July 15, 1870.

Some Colorado stocks are stronger and more active. Black Hawk has advanced to 27 @ 30c. The stock market, as a whole, is without much life, and prices generally tend downward.

Petroleums are stronger. The following is the list of quotations issued by the Board:

	Bid.	*Asked.*
Bennehoff	30	40
Bergen Coal and Oil	40	50
Bliven Oil	40	—
Blood Farm	60	—
Brevoort	1 00	—
Buchanan Farm	45	50
Central	65	70
Clinton	—	2 00
Home Petroleum	2 00	3 50
National	25	—
N. Y. & Alleghany	2 00	—
Northern Light	50	75
Pithole Creek	1 30	1 50
Phillips	15	—
Rathbone	—	40
Rynd Farm	30	33
Second National	—	75
Tar Farm	20	—
United Petroleum Farms	20	22
United States	—	80

San Francisco Stock Market.

Again prices of Comstock stocks have receded in the San Francisco market—all save Imperial. A telegram, dated July 12, quotes the list as follows:

Savage	32½	Gould & Curry	56
Yellow Jacket	34¾	Belcher	No sales.
Kentucky	26	Imperial	33
Chollar Potosi	32	Amador	228

The Slate Trade.

NEW YORK, July 15, 1870.

From Pennsylvania we hear that the quarries, machinery and slate belonging to the Penna. Slate Company, near Wind Gap, were sold by the sheriff on the 5th inst. The machinery, horses, etc., were mostly bought by Mr. A. Wooley, of Bethlehem, who, we are informed, was president of the company. The slate brought from $1 25 to $1 30 per square, on the bank, and was mostly taken by neighboring quarry-owners. The trade in this city still continues quiet, with prices unchanged. Several new companies, we learn, have been organized since our last, and are intending to continue work already begun in quarries that promise well. We shall hope for further particulars soon.

[Corrected weekly.]

PRICES OF ROOFING SLATE.

(A "square" represents 100 superficial feet.)

Vermont purple, 1st quality, per square	$9 50@10 50
" green, 1st " "	9 50@10 50
" red, 1st " "	15 00@16 00
" variegated, "	8 50@ 9 50
Pa. b'k and d'k blue, 1st qual., "	7 00@ 8 00

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending July 9, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	145	squares.
Lehigh Slate Co	35	"
Saylor & Morgan	35	"
Kuntz & Woodring	35	"
Girard Slate Co	70	"
J. Anthony	..	"
D. Thomas	..	"
Blue Mountain Slate Co	..	"
Locke Slate Co	35	"
American "	35	"
D. Williams & Co	..	"
Keystone Slate Co	..	"
Hope " "	35	"
Star " "	..	"
Columbia " "	..	"
Jones & Town	35	"
Total	460	"

SCHOOL SLATES.

D. Williams	..	cases.
Lehigh Slate Co	53	"
A. W. Lerch	..	"
Locke Slate Co	30	"
Total	83	

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co	45	squares.
Continental	35	"
Thos. W. Parry	35	"
Twin City Slate Co	..	"
J. J. Thomas	35	"
United States	..	"
Lehigh River Slate Co	..	"
William Chapman	..	"
Mauch Chunk Slate Co	..	"
New York and Penn. Slate Co	..	"
Philadelphia	..	"
Heimbach Slate Co	70	"
Total	220	"

LEHIGH CANAL.

SCHOOL SLATES.

A. W. Lerch	775	"

	Week.	Previously.	Total for Year.
L. and S. R. R.	220	3,409	3,863
L. V. R. R.	460	9,835	10,055
Lehigh Canal	..	762	762
Total	680	14,906	14,686

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00	8	
Atlantic and Pacific	Humboldt Co., Nevada					
Bates and Baxter	Colorado			50 00	15	
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00	5	
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	27	30
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Central Gold					28	30
Consolidated Gregory	Colorado				90	1 00
Combination Silver	Nevada			100 00		1 50
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5,000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 13 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E.	H. Adams, 71 Broadway	2,000,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00	15	
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Grass Valley					49	50
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		10	
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					02	03
Manhattan Silver	Nevada	M. L. Ogden	400,000		6½	8
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000		14	14⅞
Mariposa preferred	California	do. do.				
Montana Gold		G. De Cordova	400,000			
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	522,900			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000		21	
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Nye						
Ophir Gold	Comstock Lode, Nev	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		21	
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00	5	10
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000			
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	92	1 05
Social & Steptoe Con		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks						75
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Silsby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co		J. A. Simpson, 40 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Kisean, 90 B'way	5,000,000			
Derby Coal Co		W. S. Davison, 11 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co		R. H. Nodyne, 7 Nassau	15,000,000	100 00		
Ebervale Coal		G.L.Stout, Treas.,111 Br'y	500,000			
Fall River Bituminous		D. T. Blauvelt, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lykens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa			1	10
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		E. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		C. H. Smith, 165 B'way	1,000,000			
Scotia Coal Co		I. N. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		C. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		G. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		I. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copoer	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st,	1,000,000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way	500,000			
Wallkill Lead, asst		S. M. Pond, 70 B'way				10

MISCELLANEOUS.	SITUATION MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver					6½	
Quicksilver Pref					09	14
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Malden L'e	1,500,000			

On a New Apparatus for Reducing Chloride of Silver.*

By A. LEIBIUS, Ph. D., Assayer to the Sydney Branch of the Royal Mint.

IN the refinage of gold bullion by MILLER'S new chlorine process, the silver contained in the alloy thus treated is eliminated from the latter in the state of argentic chloride, which, by a subsequent process, is reduced to metallic silver.

This reduction has always been effected in the usual manner, viz., by placing the slabs of fused argentic chloride between plates of wrought-iron or zinc, with the addition of acidulated water. Although a perfect reduction to metallic silver has always been achieved, yet it required a considerable amount of time and manipulation, since the thick slabs of fused argentic chloride were, after two to three days, only partially converted into metallic silver, and had to be re-arranged in order to expedite their complete reduction. Such manipulations, however, were not only found to be very objectionable on account of the time they required, but more so on account of the very disagreeable work which they caused to the operator. The reduced spongy silver was broken up, by hand, into small pieces, in order to ascertain its complete reduction, and was then boiled in acidulated water to free it from iron or zinc.

It remained, therefore, a desideratum to effect the reduction of the fused masses of argentic chloride in a manner which would, at the same time, be quicker in its execution, and also obviate the just-alluded-to manipulations.

In 1868, Messrs. DE LA RUE and HUGO MILLER, in London, constructed a galvanic battery, one pole of which consisted of fused argentic chloride the thickness of a goose-quill, the other pole of cylinders of zinc. Adopting this principle, I have endeavored to construct an apparatus which should fulfil the requirements before referred to.

After operating successfully with a small model which allows the reduction of about 250 ounces of argentic chloride in one operation, I have, with slight modifications, constructed an apparatus which will reduce from 1400 to 1500 ounces of argentic chloride in 24 hours. The apparatus and its dimensions are as follows :—

Two thick boards, 15 inches long, are joined together on both ends by three strong battens, so as to form an open box without a bottom, 13 inches long by 14 inches wide, and 15 inches high (inside measurement). The two boards forming the length of the box or frame contain seven vertical grooves, ½ inch wide and ½ inch deep, at intervals of 1½ inches from each other. These grooves are cut down to a length of 12 inches, leaving 3 inches of each board forming the legs of the frame.

At the termination of these grooves passes horizontally a narrow slit, ½ inch deep, and along the whole length of each board, into which a strip of metallic silver, ½ inch wide and the thickness of about a threepenny-piece, is tightly fixed, projecting on one side of the frame about 18 inches beyond each board.

The seven grooves already alluded to are for holding zinc plates, ½ inch thick, 14 inches long, and 12 inches high, which rest on both sides on the strips of silver, which, as just described, are jammed horizontally into the sides of the two boards. A connection is thus established between the seven zinc plates and these strips of silver.

The second part of the apparatus consists of a wooden frame, cut out of a solid board 1 inch thick, and supplied with two large iron handles. This frame is the same length as the box holding the zinc plates, but 3 inches narrower. It contains on each side, parallel to the direction of the zinc plates, twelve slits ½ inch long, which hold silver bands ½ inch broad and the thickness of a threepenny-piece. These silver bands are passed through the slits in the board, so as to form on each side of it six loops, 11½ inches in length and ⅞ inch wide. The six loops on one side are exactly opposite to those on the other side of the board, at a distance of about 9 inches. They are intended to hold the slabs of argentic chloride, which are 12 inches long, 10 inches high, and about ¾ inch thick, and are put through these loops lengthwise, projecting on each end about 1 inch beyond the silver bands.

The whole frame holds, as before stated, six of these slabs of argentic chloride, which are placed between the six spaces formed by the seven zinc plates, from which latter they are about ¾ inch apart on each side.

The projecting horizontal strips of silver jammed into the sides of the lower frame are then connected with the ends of the silver forming the loops in which the argentic chloride is suspended ; and the whole apparatus thus charged is placed in a tub filled with water. After a short time, galvanic action is discernible ; the liquid gets gradually warmer, and a strong galvanic current is observed. After about 24 hours, the action has nearly ceased, and the whole argentic chloride is found to be completely reduced to metallic silver, which retains in the silver loops the same shape, and outwardly also, nearly the same appearance as when first introduced as argentic chloride. The latter contains always more or less chloride of copper (eliminated together with the silver during the operation of refinage by chlorine), which is reduced, together with the chloride of silver ; in fact, this soluble chloride of copper helps to act as an exciting liquor for the battery. In the first experiments, a weak solution of salt (chloride of sodium) was used as exciting liquor ; but it was found that this could be dispensed with, and only common water used (the action, however, is, in this case, a little retarded and does not become powerful until about two hours after the battery is set). By using a part of the resulting liquor from a previous reduction of argentic chloride, and which contains chloride of zinc, it has been found that the galvanic action sets in very rapidly, and accelerates thereby the completion of the reduction.

No acid is used ; and, therefore, the amount of zinc used in each reduction has invariably been found to be almost the theoretical quantity required to combine the chlorine of the argentic chloride treated with the metallic zinc, in order to form chloride of zinc.

*Read before the Royal Society of Victoria.

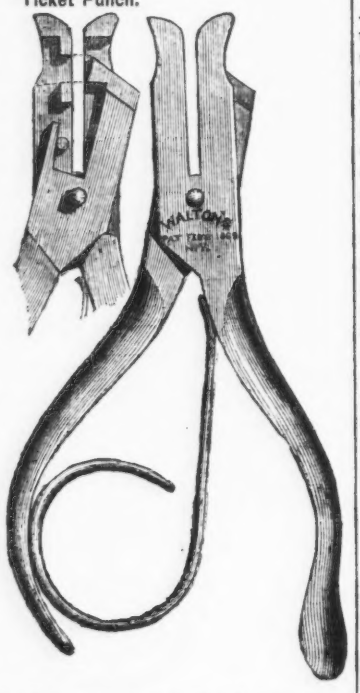
The quantity of metallic zinc thus used was always from 24 to 25 per cent. of the weight of the argentic chloride reduced.

The reduced silver is boiled out in acidulated water, in order to remove the basic and oxy-chlorides, and finally in pure water, while still suspended in the silver loops. As soon as it is taken off the last boiling, it is immediately ready for the melting pot, since the heat from the boiling water dries the porous mass of silver sufficiently to allow of its immediate melting. The seven zinc plates, when first used, weigh about 140 lbs. avoirdupois ; the six slabs of argentic chloride, of the dimensions already given, weigh about 1400 ozs. troy.

The zinc plates are used over again, until too thin for that purpose, when they are re-melted, and cast into new plates. It has been found that the quantity of zinc used is little, if at all, increased by prolonging the time of connection with the silver plates after the reduction is completed ; the whole apparatus, when once set in operation, can therefore be left to itself until it is found convenient to melt the reduced silver.

While this apparatus reduces the argentic chloride much quicker than if the latter is simply placed in contact with zinc or iron plates, it obviates any handling of the argentic chloride from the time the latter has been placed in the silver loops until the reduced silver is ready for the melting pot—advantages which have been fully appreciated by those who formerly had to resort to tedious and disagreeable manipulations.

Ticket Punch.



FOR a moment it may seem that so small a thing as a ticket punch is hardly worth a mention, and that so trivial an item as an improvement in the general form or arrangement entirely beneath notice. Yet when we consider the number of trains upon the railroads of the country, and the fact that upon each there is the conductor who is using some sort of a punch, we begin to get an idea of the immense number of men who use these insignificant instruments. They are not only in daily use but in many cases are in the hand for hours at a time ; any change, therefore, in shape or size that renders them more convenient and comfortable to use is well worthy of notice.

We illustrate, herewith, a new style of punch, which in many respects, we have not see equalled. It is made by LINSAY, WALTON & Co., of 36 John street, New York, and for simplicity, strength, and durability, cannot be excelled. It will be seen that the levers are made to fit the hand perfectly so as not to cramp the hand or make it ache.

The Employment of Nitrate of Soda in the Metallurgical Treatment of Copper and Nickel.

WE continue the account of the experiments of Prof. R. WAGNER, as given in the *Berg-und Huttenmaennische Zeitung :*

TEEATMENT OF COPPER AND CONCENTRATED MATTES BY MEANS OF SALTPETRE.

Copper and concentrated mattes consist principally of sulphuret of copper (Cu_2S) and sesquisulphuret of iron (Fe_2S_3). The feasiblity of the employment of saltpetre for refining the copper in these mattes is proved by the following :

1. J. PERCY, in his "Metallurgy," Vol. I., p. 262, has shown that sulphuret of copper, treated with melting saltpetre, under exclusion of the air, surrenders all the copper in a metallic state, while sulphate of soda is formed as a slag :

$$Cu_2S + Na\,NO^6 = 2\,Cu + NaSO_4 + NO_2.$$

2. That sesqui-sulphuret of iron, when treated in the same manner with saltpetre, is completely transformed into oxide of iron and sulphate of soda.

$$Fe_2S_3 + 3\,NaNO6 = Fe^2O_3 + 3NaSO_4 + 3NO.$$

When air is present a much smaller amount of saltpetre is sufficient to oxidize the sulphuret of iron.

A surplus of saltpetre is not only disadvantageous economically, but also because, by a surplus of saltpetre, metallic copper is instantly changed into oxide of copper, while caustic alkali is formed. On this reaction WOHLER has based a method of producing pure caustic soda.

Since F. KUPELWIESER has succeeded lately in removing the greatest part of the iron and sulphur from copper-matte by the application of the Bessemer process, still more inducement is held out to profit by the oxidizing and dissolving properties of saltpetre in the manufacture of copper, or, at least, of concentrated mattes, rich in copper. To render the work of concentration by means of saltpetre economically advantageous, the application of the method to practical working in the furnace must be made in such a manner that the nitric oxide, resulting from the reduction of the nitric acid, may be used in the manufacture of sulphuric acid. In an analagous manner, the nitrous vapors resulting from the treatment of chromic iron ore with saltpetre have been used in the manufacture of sulphuric acid already by K. LAING and G. H. COSSINS. The experiments described in the sequel were made with a concentrated matte of the following composition :

Copper	58.61
Iron	16.17
Sulphur	20.93
Small quantities of nickel, zinc, slag, etc	4.29
	100.00

TO BE CONTINUED.

Earthquakes and Volcanic Eruptions of 1869.

THE *American Scientific Monthly*, a capital magazine, edited and published in Iowa City by the accomplished Prof. GUSTAVUS HINRICHS, translated from *Der Naturforscher* an interesting article on the above subject, as follows :

More than a hundred earthquakes are recorded as having occurred in different parts of the globe during the year 1869. Most of these consisted of single shocks, but many of them were prolonged over weeks, and even months.

In these continuous earthquakes the shocks followed each other sometimes in rapid succession, sometimes more slowly. For example, at Ragusa, in Dalmatia, where an earthquake continued throughout the entire first half of the year, fifty-three shocks were counted in the course of four weeks (in May). Even the well known earthquakes which disturbed the countries bordering on the middle Rhine during the winter months of the past year were, notwithstanding their comparative feebleness, characterized by a great number of separate shocks. At the town of Groszgerau, over six hundred had been perceived up to the end of the year. The extent of territory over which these shocks were felt was by no means small, at least, in the case of the severer ones. In many instances, earthquake shocks very distinctly felt in Groszgerau, were also observed in Marburg, on the one side, and in Stuttgart and Saarbrücken, on the other. The more violent earthquakes of the past year were distributed among one hundred and thirty different days. It should be remembered, however, that many were of long duration, consisting, besides the stronger shocks, of a great number of feebler ones. We should recollect, also, that there are regions, such as Panama, and the groups of islands southeast of Asia, where earthquakes occur almost daily, only the severer ones receiving any special mention. Bearing these facts in mind, it becomes probable that not a day passes of the whole year, perhaps not an hour, without the occurrence of an earthquake shock somewhere. Among such a multitude of shocks, it will be readily comprehended that, in many cases, shocks were felt in different, often widely separated, countries on the same day. This was the case on the following days of the year 1869 :

January	10,	in	Siebenburgen	and East Indies.
March	1,	"	Steiermark	" Athens.
April	1,	"	Bucharest	" Caucusus.
"	18,	"	Constantinople	" Symi.
June	6,	"	Chemnitz	" New Zealand.
July	23,	"	Guyaquil	" Visp (Switz).
August	21,	"	Peru	" Caucasus.
October	2,	"	Cormons	" Rheinthal.
Nov.	12,	"	Groszgerau	" Baeska (Hun).
"	25,	"	Innsbruck	" Mayence.
"	26,	"	Altdorf	" Mayence.
Dec.	18,	"	Mayence	" Hildesheim.
"	27,	"	Darmstadt	" California.
"	28,	"	Groszgerau	" Corfu.

These earthquakes were distributed with considerable uniformity among the different seasons and months of the year. The maximum number occurred during the spring (27) ; the minimum during the autumn (22).

Eleven volcanic eruptions were recorded during this year. Of European volcanoes only Ætna is here included, and its activity was only of a few hours duration. Only among the less known volcanoes of Southern and Central America—Puraci in Columbia, Cotopaxi, Pinchinca, Misti, etc.—were there any violent eruptions.

Santorin—celebrated on account of the volcanic formation of several new islands during the year 1866—is not yet extinguished ; its eruptive activity, however, seems to be now on the wane.

Nickelizing or Plating with Nickel.

WITHIN the last twelve months, perhaps, we have heard, from time to time, of a process for electro-plating with this almost indestructible metal, and have seen some of the specimens which to us appeared to be a success. The method has been patented, we understand, by Mr. ADAMS, of Boston, who claims to have discovered the process by which the deposit is effected. A paper on the subject was read by Mr. GAIFFE, the French agent or partner, in Paris, on the 17th of January last, before the Academy of Sciences, in which it is stated that the presence of even the smallest quantity of potassa, or soda, or alkaline earths in the bath containing the nickelizing preparation, is injurious to the properly adhesive coating of the metal. The use, he said, of perfectly pure double chloride of nickel and ammonium, or of perfectly pure sulphate of nickel and ammonia, and also of perfectly pure nickel as one of the electrodes, is required. By these means the nickel is made to adhere regularly and strongly, and only needs polishing after the metal coated over is taken from the bath. At the next meeting of the academy M. BECQUEREL, who is a high authority there on all electrical subjects, stated that eight years ago he had applied, for the purpose of the electro-deposition of nickel on other metals, the same method as described by M. GAIFFE and his associates. M. BECQUEREL stated further, that since the last meeting he had purposely repeated some of his former experiments, with the express view of ascertaining whether the statements made by GAIFFE, concerning the injurious action of the presence of potassa, be correct or not. The result is that potassa in no way effects injuriously the deposition of nickel, since the double sulphate of nickel and potassa can be applied as well as the double sulphate of nickel and ammonia ; but if the positive electrode is not made of nickel, it is necessary to add free ammonia in order to saturate the sulphuric acid which is set free.—*Druggists' Circular.*

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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A Question In Steam-Engineering.

WE have received from a Southern correspondent the following letter:

TO THE EDITOR.—*Sir:* In your issue of the 5th inst., you tell us the very ingenious Ericsson, in using his wire gauze, knew not "a certain amount of heat had already been converted to motion."

This mechanical equivalent of heat has clearly shown the futility of the many years' scheming of others beside Ericsson, and proved many things wrong that were once thought right.

When at sea with a condensing engine of 500 horse-power, vacuum 27½ in., pressure of steam, say, 15 lbs., it is important to know what amount of water can be taken out by the bilge-injection, should the vessel spring a-leak. I know that the experiments of FAIRBAIRN and others have shown that the sum of the sensible and latent heat *is not* always a constant quantity; but, assuming that it is so, that the condenser temperature is 100°, and that one cubic foot of water is evaporated per horse-power per hour, and that the temperature of water injected is 70°, we used to think 300 cubic feet of water per minute could be taken out by the bilge-injection. Will you be kind enough to tell us how much of this heat, under the conditions stated, would be converted into motion, and thus lessen our estimate of water pumped out?

This matter, I presume, would interest many of your readers.

N. CAHMMINGS.

UNIVERSITY OF NASHVILLE, July 11, 1870.

The calculation upon which the estimate of three hundred pounds, above referred to, is based, is roughly as follows: One cubic foot of water evaporated per horse-power per hour is equivalent, under the conditions given, to five hundred cubic feet per hour, or about 521 lbs. of water evaporated per minute. This water has an initial temperature of 100°, and is converted into steam, the sum of the sensible and latent heat of which may be assumed as 1190°. The amount of heat communicated to the water may therefore be estimated at about 620,000 heat units per minute. This includes, however, the heat expended in raising the temperature of the water from zero to 100°, or 52,100 units, which being subtracted, we have 567,900 units. If the engine performed no work, all this heat, except such as is lost by conduction, friction, etc., would reappear in the condenser. Deducting 7,200 units for these losses (an amount equal to about one-third of the effective power), we have 560,700 heat units, or an amount of heat capable of raising 560,700 pounds of water one degree; and this is the amount which must be abstracted from the steam, in order to condense it again to water of 100°. A portion of this heat, however, is abstracted from the steam, in the performance of work by the engine. But if the whole of it entered the condenser, the amount of water injected at 70°, required to produce the condenser-temperature of 100°, might be easily ascertained, as follows: Every pound of the injected water is capable of receiving 30° of additional temperature, or, in other words, 30 heat-units. To absorb 560,700 heat units, therefore, 18,690 pounds, or about 300 cubic feet of water, would be required. This is, therefore, the capacity of the bilge-injection, under the circumstances, given by our correspondent; and his question is, How great is the error in this result, due to ignoring the loss of heat in work performed?

The error thus occasioned is probably less considerable than one would at first suspect, since the proportion of heat actually utilized in work is very small. Five hundred horse-power is only about 21,500 heat-units per minute; and this is the sole deduction to be made for the loss of heat in work. It is less than one-twentieth of the heat actually given to the steam. Making this deduction, we have 539,200 heat-units to be absorbed by the bilge-injection, requiring 17,973 pounds, or about 287 cubic feet of water, instead of 300. The error in excess is therefore, according to these calculations, about thirteen cubic feet of water.

Professor Roessler.

A FEW weeks ago we communicated to our readers the departure of Professor ROESSLER, the accomplished geologist of the Land Office, for the copper region in the Wichita country, northwestern Texas. The Professor intended to make an extensive survey of the important mineral deposits of that vicinity, and we anticipated that he would publish his report in the fall. We regret to have to report to-day that our expectations are probably doomed to disappointment, as will appear from the Texas *State Journal* of June 16, 1870:

"The mail driver between Griffin and Richardson, named JAS. TAYLOR, was attacked about eight miles beyond Belknap, at the Salt Fork of the Brazos, by Indians, killed and scalped. There was neither guard nor passengers. The mail bags and mules were carried off, and have not yet been recovered. This murder occurred on the 2d of this month. The news was brought by Mr. T. D. ST. JOHNS, direct to us from Port Griffin. The same gentleman brings tragic news from Professor ROESSLER, who lately started, with an escort of the Sixth Cavalry, from Fort Richardson, to explore the copper region of northwestern Texas. While in the Wichita country, and travelling carelessly, with two wagons and a hack, the escort being far in advance, they were attacked suddenly from the thickets by the savages, and all of the party, except Professor ROESSLER, slain. The escort galloped back in time to save the Professor's life. The whole party then returned to Fort Griffin. Set down another devilish debit to the Indian account."

We are happy to congratulate the Professor on his escape. It would have undoubtedly excited general regret and indignation, if a gentleman who has already benefitted the cause of science in this country so much by his labors, had perished by the hands of the savages. At the same time, this accident shows how much the Indians all over the West are stirred up this season, and that danger from this source may be expected even in regions not very remote from the settlements, and altogether away from the country of the northern tribes, from whom the most danger is at present anticipated.

Test of Steel Rails.

THE steel rails made by Messrs. JOHN A. GRISWOLD & Co., Troy, N. Y., are tested in the following manner: 1. A small test ingot from each five-ton ladleful of liquid steel is hammered into a bar, and tested for malleability and hardness, and especially for toughness, by bending it double cold. In case any test bar falls below the standard established as suitable for rails, all the ingots cast from that ladleful of steel are laid aside for other uses. 2. An ingot seven inches square is drawn into a bar three inches square. This bar is laid on iron supports one foot apart, the iron supports resting directly on a fifty-ton anvil block.

A steam-hammer ram, weighing seven tons, is then dropped on the centre point of the bar between the supports, with such a fall that the bar shall permanently bend at least to an angle of one in twelve. The bar is then reversed, with the convex side up, and the blow is repeated, bending it straight again. If the bar breaks, or shows signs of fracture under the reverse blow, the whole charge of steel from which the test ingot was made, is rejected. If it does not break, the test is continued, reversing after each blow until fracture occurs. The grade is then marked on each ingot of the charge, and to prevent mistakes, no ingot not so marked is allowed to go into the rail-mill.

A single blow has heretofore been considered a sufficient test. Those familiar with the nature of steel will readily observe, however, that the reverse blow is a vastly more severe test. No steel that is not extremely tough and uniform, and properly manufactured, can stand the reverse blow, although a comparatively inferior steel will often stand a greater deflection in one direction. The blow of a ton weight falling ten to fifteen feet is considered a severe test; a seven-ton weight falling from a less height, more nearly represents in kind (although it of course exaggerates in severity) the test of actual service in the track.

It will be observed that the test ingot is only seven inches square, while the ingots from which the rails are made are twelve to fourteen inches square, so that a rail of, say sixty-five pounds' weight, receives four times as much reduction and work as the test bar, and is therefore more sound and tough. From the comparative tests of over five thousand rail ends, in the manner described, as well as from similar tests made elsewhere, it may be certainly concluded that all parts of a ladleful of liquid steel are substantially the same in quality, so that a test ingot really determines the character of the whole product made from the same charge.

In addition to this double test, the rails are rigidly inspected for surface imperfections. They invite railway companies to send inspectors to their works, to witness the tests mentioned, and other tests and inspections agreed upon; and they have perfected the above-described rigid and thorough system of determining the actual toughness of their steel, and of preventing the making up of inferior steel into rails, in the belief that these actual results will be much more acceptable to railway managers than a mere specification of any particular methods of manufacture. They are, however, prepared to make rails to any specification, provided the reverse bending test is not omitted.

Temper of Steel.—Messrs. JOHN A. GRISWOLD & Co. explain the importance of their system of grading steel by stating (what is, of course, well known by engineers,) that all steel, whether made by the Bessemer or the crucible process, when adapted to resist the greatest statical pressure, is too much carburized, and has too little ductility to resist violent blows. Their grades of steel are from I (hard) to V (very soft), as explained below. These grades are determined by testing a trial ingot from each ladleful of steel; the grade is then stamped upon the steel, and followed through all the subsequent processes of hammering and rolling.

Special Tests.—In addition to the test above mentioned, they are prepared, when required, to subject a piece from the end of each bar of steel to cold bending by the blows of a drop, and to stamp the grade on each bar in accordance with this test.

TABLE OF GRADES.

I. Hardens and works hot and cold like high tool steel. Very high tensile strength. Low ductility. Adapted to resist steady pressure and wear.

II. Hardens and works like low tool steel. Will not bend cold after hardening. Bends a little cold when annealed. High tensile strength. Suitable for plough steel. Adapted to stand severe wear and statical pressure.

III. Hardens slightly on the surface. Will stand a bright red or low yellow heat. Will bend cold slightly after hardening, and is quite ductile when annealed. Adapted to machinery purposes when subjected to wear, and to all strains except violent percussion. Suitable for shafting, lathe spindles, etc.

IV. Hardens very slightly without losing its ductility. Will stand a yellow heat, and weld easily with a flux. An inch bar annealed will bend double cold. Tensile strength about 90,000 pounds. (This steel is adapted to nearly all railway and machinery purposes, such as rails, axles, connecting-rods, etc.; wagon-axles, tyres, etc. It is ductile enough to resist percussion, and homogeneous and dense enough to resist wear.)

V. Does not harden. Stands a high iron welding heat, and welds very readily. Very soft and ductile, but much stiffer and stouter than iron. An inch bar will bend cold into a close fold. Suitable for boiler-plates, and for parts that are to be subsequently case hardened, such as carriage-axles.

Rear Admiral Dahlgren.

THE daily press announced to us a few days since the death of Rear Admiral JOHN A. DAHLGREN at his quarters, in the Washington Navy Yard, on the morning of July 12. From an editorial notice in the New York *Times* we extract the following brief notice of his career: "Admiral DAHLGREN entered the service nearly forty-five years ago, and soon turned special attention to the study of ordnance and gunnery. To these branches of the service he devoted himself with unswerving fidelity throughout his entire life. While yet a lieutenant he invented the light twelve-pounder boat howitzer and gun-carriage, which bear his name, and by this achievement at once established his reputation as an ordnance officer of attainments and practical ability. As a reward for this invention he was assigned to ordnance duty, and by a special act of Congress was allowed to draw the pay of the next grade higher than that which he actually held by commission. We believe this is the only case in which such an honor has been conferred upon a United States naval officer.

"Availing himself of the facilities he enjoyed in his new post, DAHLGREN began experimenting with large guns, and soon obtained the permission of the Government to build a nine-inch and an eleven-inch shell gun. He was successful in both of these attempts also, and so perfect was his plan of construction that the guns, which he had only intended to throw shells, were found equal to the strain of solid shot as well. He also introduced a new pivot carriage, on which to mount his eleven-inch gun. He commanded the 'Plymouth,' the first vessel which ever sailed with nine-inch broadside and eleven-inch pivot guns. He also made improvements in our shrapnel shot, and prepared most complete tables of ranges and sights for all classes of naval guns, and, indeed, it would be difficult to estimate or enumerate all the improvements he introduced in naval ordnance, for there is little connected with that branch of the service which he did not seek to render better than he found it. As a brother officer said, in speaking of him: 'He reduced the mathematics of gun making to the simple rule of thumb, so that any one could make a gun or shot by following his directions.'

"Admiral DAHLGREN was a thoughtful student, but he was also a good manager of men, and had the reputation of getting better returns of work from a band of artificers than any other ordnance officer in the service. His distinguished services in the Ordnance Department gained him the reward of a vote of thanks from Congress, and promotion to the grade of Rear Admiral upon the re-organization of the navy in 1863.

"In personal appearance Admiral DAHLGREN was of medium height, of slight but wiry build, with a clear gray eye of remarkable penetration. He was all his life a student, and to a stranger his manner was often somewhat reserved; but with his friends he was a free and agreeable converser, and especially delighted to talk of his profession with all who could impart, or desired to receive, information. Since the war he served a full term of two years as the commandant of the South Pacific Squadron, and upon his return was again made Chief of Ordnance. He was relieved of the duties of that position at his own request, and assigned to the command of the Washington Yard, where he could still pursue his experiments in gunnery, which he continued up to the time of his death."

New Publications.

WE have received what we suppose is nearly the final instalment of the Paris Exposition reports, comprising the Report on Education, by Mr. JOHN W. HOYT; the Report on Clothing and Woven Fabrics, by Mr. BRIAN STEVENS; Extracts from the Report of the International Committee on Weights, Measures and Coins; and finally, a volume intended as an Introduction to the whole series, and containing selections from the correspondence of Commissioner General BECKWITH and others, showing the organization and administration of the United States section. Mr. HOYT's report is valuable, but not so good as its bulk suggests and its subject demands. The material might have been more clearly classified, and suggestively discussed. Apparently the abundance of matter was too much for the author. Yet we do not know of any one volume in which so much important information concerning the educational systems of different nations is collected. Even a mere compiler, however, should not have omitted the great question of the day—the education of women. The part devoted to schools of instruction in mining is ridiculously deficient. We have half a page of introduction, four pages on the schools

of all Europe, half a page on the mining departments of scientific schools in this country, and then ten pages on the Columbia College School of Mines, comprising apparently the whole prospectus of that institution. With every desire to assist the Columbia School, we protest that it is not necessary to send commissioners to Europe to obtain copies of its catalogue. The object of the Paris Exposition reports is to enable us to gauge our own progress and condition in every department by that of foreign nations; and when our agents return with what we suppose to be the picture of the world which we ordered, and we find that they have brought a looking-glass instead, it may tickle our vanity, but it disgusts and disappoints our desire for knowledge.

Mr. STEVENS' report on Clothing and Woven Fabrics is brief and sketchy, but interesting. The critic finds some difficulty in judging all these reports, from the lack of a standard with which to compare them. Dr. BARNARD'S marvellous volume is too severe a test. In comparison with that, everything done by other commissioners sinks into insignificance, except, perhaps, the contributions of HEWITT, BLAKE, and AUCHINCLOSS. Then there is a class of these reports which are excellent, so far as they go; but not comprehensive. Among these may be placed the reports of SMITH, BECKWITH, D'ALIGNY and STEVENS. And then there are the mere compilations, not without value, but falling below their pretensions, and these we will not name.

The extracts from the Report of the Committee on Weights, Measures and Coins, are merely tables setting forth the systems of different countries; and the volume of correspondence gives the history of the Exposition, and, to some extent, of these reports. A final pamphlet, containing the Bibliography of the Exposition, prepared by Mr. BLAKE, who has so ably edited the whole series, is still in press.

On Two Peculiar Products in the Nickel Manufacture.

By JOSEPH WHARTON.

I.

SEVEN years ago, when I was about to commence operations at Gap Nickel mine and furnace, I noticed among the fragments left by my predecessors a piece of nickel matt, which contained occasional plates, apparently of a metallic substance, tough, pliable and elastic; these plates were about as thick as fine writing paper, from one-tenth to one-eighth of an inch wide, and twice as long. No chemical examination of them was made except a slight qualitative examination showing the presence of nickel, iron and copper.

Having on several occasions subsequently noticed some tendency to a similar appearance in the matt, I gave directions that, when it should next be observed, a close examination should be made, after the extinction of the furnace producing the peculiar matt, of the solid mass which always remains in the bottom of the furnace.*

This solid mass consists in part of lumps of ore, flux and fuel of the first charge, which reached the hearth imperfectly melted or consumed, and so remained, and in part of accretions from the thoroughly fused matt which, as the furnace worked, formed a pool over and enclosed those lumps.

The cavities of such a mass seemed to me favorable for the production of crystals when a tendency to crystallize existed. Last midsummer very interesting groups of crystals were, in fact, found upon breaking up one of these masses to fit it for re-melting; they were so small, however, that, except for search being made in consequence of the matt of that furnace having exhibited the plates above named, the crystals would probably not have attracted attention.

Some of these crystals are cubical, with a bright metallic lustre, the groups closely resembling miniature geodes of galena; others are minute octahedrons, arranged in spiculæ, and in dendritic or plumy forms, resembling the fern-like aggregations of zinc crystals which I sometimes found in the prolongs of my spelter furnaces at Bethlehem, Pa.

These crystals are very tough and are highly magnetic. A spicula of the octahedrons can be bent many times without breaking, and one which was floated upon water, after being lifted a few times by a magnet, pointed steadfastly to the north, and showed attraction and repulsion to the poles of a magnet, just as a steel magnetic needle would under like circumstances. A specimen of the octahedral crystals, and a specimen of the granular or almost crystalline solid matter to which they were attached, were submitted for analysis to the chemist of my establishment, with the following results:

	Crystals.		Granular.	
Cu	1.85	0.466	1.74	0.438
Ni and Co	25.22	6.837	28.20	7.640
Fe	64.10	36.622	62.50	35.861
S	8.90	43.925	7.60	43.939
	100.07	1.4.93	100.04	1:5.78

The subordinate column in each case shows the quantity of S which would be requisite to form, with the metals found, the compounds Cu_2S, Ni_2 and Co_2S, FeS; the ratio, below it, is that of the S found to that thus calculated.

If we conceive the copper to exist as Cu_2S, we then have 89.32 parts Fe, Ni, and Co in combination with 8.43 parts S: taking then the average atomic weight of the metals according to the proportion found, as 56.85, the atomic ratio of the metals to that of the sulphur is as 31.4 to 5.27, corresponding very closely to the formula R_6S.

Should the copper be included in the average, we get the the figures R 32.00, S 2.56, indicating, though less accurately, the same formula.

II.

Desiring last year to make, in a granulated form, an alloy consisting of ¾ nickel, ¼ copper, I caused a mixture of the oxides of those metals in the due proportions to be heated in closed crucibles with charcoal in a blast furnace; by this means reduction and fusion resulted, and the fused alloy was poured into water at a high white heat.

Among the granulated metal were found large numbers of hollow spheroids varying in size from peas to large chestnuts, many of them imperfect and torn, but many of them tolerably regular in shape, one side being usually bright and smooth, while the other was rough and pimpled.

As, upon crushing these with a hammer, the anvil was moistened, I examined a considerable number of them, and found that they were nearly full of water, so that the water distinctly rattled within them when shaken, and showed itself in quantity when the larger sphroids were carefully broken. Fluid metal, poured white-hot into water, had formed metallic bulbs filled with water.

For several days I carried some of these bulbs in my pocket, occasionally rattling the water in them, before the manner of their formation occurred to me. My first idea—that drops of metal falling upon the water were flattened by the blow, and that the edges then instantly clasped together and became welded, enclosing water within their grasp—was obviously untenable, for the eye could detect no seam or crevice, and besides, how could water exist as a liquid shut in by walls of this refractory alloy at a welding heat? Apple dumplings are formed in a manner somewhat similar to that, but these bulbs were not so formed.

The true solution is doubtless this: The metal when poured was in a state of ebullition, was giving off gas; not probably metallic vapor, but perhaps carbonic oxide.

The separate globules into which the thin streamed divided upon entering the water, were each emitting gas when contact with the water produced upon their surfaces an impervious film of solid or pasty metal. The continued evolution of gas in the fluid interior of such globules could have then no other effect than to distend the globule into a bulb, whose upper side might well be pimpled by the effort of tiny gas bubbles in the pasty shell to escape upward, while similar tiny bubbles working upward in the crust of the under side would reach the interior cavity, thus leaving the lower surface smooth and bright.

Multitudes of incipient globules were, of course, torn and distorted by reason of the internal gas finding a vent, and, of course, any which were rent must necessarily be filled by the water in which they were plunged. Those, however, in which the eye found no aperture were doubtless filled, after the coldness of the external water had so contracted the heat-rarefied gas as to produce an approximate vacuum within the bulb, by the slow imbibing of water through minute pores to supply that vacuum. That such pores existed was shown by the fact of the bulbs all, in time, losing their water by exposure to a desiccating atmosphere.

Not all the pots of metal produced, when poured, such globules, for not all were in the fit state of ebullition.

The nature of the disengaged gas might, perhaps, have been determined, if a sufficient quantity had been collected by breaking the globules under a receiver, but this was not done—*Am. Journ. Sci.*, xlix., 365.

PHILADELPHIA, March, 1870.

* It should be explained that the furnaces in question are small upright blast furnaces, in which the ores of Gap Mine (nickeliferous pyrrhotite with two per cent. Ni and Co) previously roasted, are smelted for the first time, the product being a matt containing about twelve per cent. Ni and Co, with about four per cent. Cu.

Traction Engines.

TO THE EDITOR: Sir—In your number of June 14, you give a description of a traction engine which may be considered out of date since the invention of Mr. THOMPSON'S patent road steamer, with India rubber tires. It seems strange that so little notice should be taken of these latter engines in America, as they as much surpass any former attempt to use steam on common roads as the locomotive exceeds the traction power of horses. Their use in this country would be immense were their advantages sufficiently understood, where the common roads are so bad as to render the movement of heavy loads drawn by horses difficult, except in winter. Also, for ploughing on the Western prairies, and for passenger and freight traffic on branch lines from railroads where the construction of a track would be too expensive. They have been introduced in Scotland and Ireland, as well as in Ceylon, and have everywhere given the greatest satisfaction.

The following opinions, by competent authorities, will give a better idea of them than could be otherwise attained:

From the "Engineer" of Sept. 10, 1869.

"One of Mr. THOMPSON'S six-horse power road steamers has been working regularly for the last three months and a half between Aberdeen and the Kettock Flour Mills. It runs four times daily through the town of Aberdeen, on its way to and from the flour mills. The distance each way is three and a half miles, and the road is of the worst possible character; indeed, it is doubtful whether in the whole kingdom any equally bad could be found with any considerable traffic on it. For one-half of this road, which is narrow, crooked and excessively greasy in bad weather, the gradients vary from 1 in 9 to 1 in 7½. The duty of the road steamer, whose own weight including coals and water, is barely six tons, is to take a load of ten tons up this acclivity, which it does with the most perfect ease. It will easily be seen, on calculation, that taking the coefficient of road friction as 1.40, which is established as the average on a good level road, the drawing of ten tons of load plus six tons of road steamer, up 1 in 7½, is equivalent to drawing 100 tons on a level road. The nominal six horse-power engine actually develops, at certain points of its journey, forty-five indicated horse-power. It performs four single journeys daily, with a load of ten tons each way, taking wheat to the mill and flour to the town, and it does the three and a half miles in one hour. The consumption of coals, including the getting up of steam in the morning, the four journeys, and three hours loading and unloading, during which steam is kept up, is ¼ ton per day."

Mr. THOMPSON'S patent "pot-boiler" proves a marvellous steam generator, and gives the completest satisfaction. The engineer of a company for whom a road steamer is now building, went down to Aberdeen to watch the working of the road steamer employed there, and in a report dated the 14th day of the present month, he says: "The driver told me the boiler has twice been looked into during the last 3½ months. On both occasions the pot was perfectly clean, and as far as could be seen, the tubes were in good order, and not in any way affected by the superheating. All the working parts of the engine have stood well, and seem as if they would last long enough. The toothed wheels show no appearance whatever of wear. The weather was so bad that I made no note of time or of coals burned. The performance was perfect."

The durability of the India rubber tires surpasses all expectations; no wear whatever is perceptible on their surface. The engineer just mentioned says that when the Aberdeen road steamer was first started he privately scratched with his penknife his initials on one of the tires, and now that the steamer has run over 1,000 miles, he finds, on examination, his inscription still intact. The inside of the moulds in which the tires are cast necessarily shows the fine marking of the turning tool, and these marks it communicates to the India rubber. A set of tires which have travelled some hundreds of miles were recently inspected with a magnifying glass, and the delicate markings were discovered to be as distinct and sharp as on the moment of issue from the moulds.

Mr. ABERNETHY, of Aberdeen, himself an engineer, says:—"We took out a 15 ton boiler to Stoneywood yesterday on a 4 or 5 ton wagon, with 2 feet 6 inches and 4 feet wheels right down Union street at a speed of three miles an hour at the busiest time of the day, all the way in the single gear except about 100 yards of steep in Brown street and the Brae at Greenburn, where that single gear failed us—at least it was about a balance, and we put on the double gear. Usually we have had to have men behind with ropes, to hold back on the brae down to Stoneywood, but the engine was drag enough of itself almost. It certainly is a feat for a 5 ton engine to drag out a 20 ton load and climb gradients of 1 in 20 with single gear. We had all Aberdeen turned out as we passed. It was an unusual sight to see the infant Hercules in front of the great boiler 30 feet long and 7 feet in diameter, bowling along with it like a plaything at its tale while the plaything itself shook the houses as it danced over the rough causeway."

The last and perhaps most remarkable performance of the road steamer took place as recently as Tuesday, the 17th ulto., and on that day the question whether steam-ploughing can be done by direct traction was most emphatically answered in the affirmative. The judges of the Royal Highland and Agricultural Society had decided that the ploughs and reaping and mowing machines selected by them at their last show, should be tried on the fields of a farm in the neighborhood of Edinburgh on the 17th. Mr. THOMPSON had long been impressed with the idea that from the road steamers' facility of running over soft ground without sinking, owing to the India rubber tires, which, at the same time, bite the surface with surpassing tenacity, it would be eminently adapted for steam-ploughing. Accordingly he resolved to avail himself of so good an opportunity for putting his engine to the test, and on the morning of the trial one of his six horse-power road steamers was on the ground. Whilst awaiting its turn, it displayed its manageableness and handiness in various ways, and most strikingly when requiring water it ran down a long steep grass hill with gradients of 1 in 4½ to a barn, where it filled its tank, and then ran up the hill again. At last the moment came for it to engage in its new task. Two of FOWLER'S double furrow ploughs were attached to it, and with an eager throng of spectators composed of agriculturists and engineers running along on either side of it, it commenced work. On and on it went, making four straight deep, wide furrows. Nothing more perfect could be seen. With FOWLER'S ingenious ploughs, when the handle is once set, no guidance is needed and so four furrows were thrown simultaneously without a hand being put to the plough. Arrived at the end of the field it turned with far greater ease than horses could have done, and ploughed its way back again up a hill with inclines of 1 to 12. The ploughs were set as deep as possible and the work done was quite first rate. It promises to be of incalculable value to farmers, as it will enable them to dispense almost entirely with horses, since it can fetch its own fuel and water, and can be employed in ploughing, reaping and mowing, in carrying manure and taking produce to market.

The London *Times*, of Feb. 28, 1870, says: Mr. R. W. THOMPSON, C. E., of Edinburgh, the inventor of the road steamer, having experienced much annoyance from the defects of traction engines, and finding none able to do work for which he required them, conceived and carried out the idea of providing the wheels of a steam-engine to run on common roads with India rubber tires of immense thickness. When the first patent road steamer was tried, some two years ago, its success was complete and far exceeded the expectations and hopes of the inventor. Since then he has been engaged in building numbers of these engines to send to all parts of the world, and the record of some of their performances will doubtless be found interesting. A 3 horse-power engine drew a boiler weighing 13 tons up an incline of 1 in 12—the ground being so slippery at the time from frost that horses could not keep their feet. The engine was run through a grass field without leaving a track, and again through a field covered to the depth of two feet with loose earth; a ten horse-power engine weighing eight tons ran with four wagons attached to it to a colliery twelve miles from Edinburgh, there received a load amounting with wagons to thirty-two tons, making the weight of the whole forty tons, and then returned up inclines of 1 to 16 to Edinburgh. It wended its way with its train of ninety feet with perfect facility through the narrow streets of the old town which chanced on the occasion to be thronged with vehicles carrying people to some open air festivity. It turned all man-

ner of sharp corners, ran down the steep hill to Leith, entered a lane, and drove in through the gates of the factory where it delivered its load. An engine was driven into a newly dug potato field and ran about in every direction leaving the soil quite undisturbed. A ten horse-power engine drawing a load of seventeen tons of pig iron was drawn along the Granton road at the rate of eight miles an hour. The same engine was run along the sea sands from Portobello to Joppa, running through the loose dry sand and over the soft wet sand, and even through a creek of running water, with as much ease as if it had been running along a turnpike road. It was driven over long beds of broken flint laid down for road mending and the motion to those riding in it was as smooth and pleasing as if it had been going over a lawn, while the stones remained undepressed. A six horse-power engine took a load of thirty-four tons up an incline of 1 in 18. Engines with omnibuses attached to them have run frequently through Edinburgh up the long steep hill from Leith and up and down the steepest streets of the city. Their speed is from eight to ten miles an hour. Up an incline of 1 in 8 the road steamer, which weighs six tons, takes in tow a load of ten tons. It may help to realize what 1 in 8 represents to mention that the deepest gradient in crossing the Simplon is 1 in 13. This engine has already run over 2,500 miles, and has carried nearly 8,000 tons. The India rubber tires have often been compared to an elephant's foot with its soft and yielding pad.

The road steamer is exceedingly compact and trim. It runs on three wheels—two large ones, and a smaller one in front. The India rubber tires for the three wheels of a ten horse-power engine weigh 14 cwt. To cast such enormous masses of vulcanized India rubber was in itself a question demanding no little ingenuity, study and enterprise. The tires are guarded by flexible shields, formed of open steel bars, which give an excellent bite, or hold, upon the ground; and while they do not in any way interfere with the elastic play of the India rubber, they afford such protection to it as to render it virtually indestructible. The shields, which are removable, are not used for driving over ice or frozen snow, as on such surfaces iron will not bite, and here the India rubber is of immense advantage, as it runs over them with perfect ease, and without slipping. In running through sand also, as in Egypt, the shields are entirely dispensed with. Some artillery officers were much struck, when observing a road steamer with a heavy vehicle attached to it, being driven round and round in a field thoroughly saturated with melted snow. It left the merest track in the slushy ground, while the wheels of the vehicle behind cut it into deep ruts, but as the engine passed over these ruts, when retracing the circle, it effaced them, and by and by, being detached and allowed to run over the spot alone, it repaired the surface, and made it perfectly smooth and even. It was clear, therefore, that if road steamers were engaged in hauling cannon, on whatever kind of road, a second engine following in the path of the first, instead of aggravating the holes and ruts made by the artillery preceding it, would smooth them out and restore the road to a good condition for its successors. We learn that the Indian government is about to inaugurate a new system of military transport by means of well organized trains of road steamers, and that the first road steamer to be used for this purpose is being sent out by the Suez canal.

SCRANTON, July 1, 1870. D. COGHLAN.

Wonderful, if True.

Two mechanics employed in the establishment of Messrs. NEAFIE & LEVY, Philadelphia, claim to have discovered a new method of working scrap steel into a tough, merchantable bar, equal to all and superior to most ordinary grades. A correspondent, describing the process, says: "In several cases these bars were made of extremely small pieces, files, etc., merely fagotted together, heated until it would appear all character of steel was gone, then covered lightly with the preparation and drawn down under the hammer. From this steel, so made, sledges, turning and planing tools, chisels, flatteners, slotting machine tools, crank pins, guide bars, valve seats, etc., have been made. The tools will not fly or chip, and have lasted better and done more than any used previously in the establishment where they were made. The crank pins, etc., have stood greater tests than any previous, and in an establishment like that of Messrs. NEAFIE & LEVY, where steel does not mean iron, or converted iron either, and where work, before it leaves their shop, has to undergo the most severe test used in this country, this 'means business.' Perhaps the most gratifying part of the process is that this steel can be manufactured at a cost of labor and flux not to exceed two and a half cents per pound! As the cost of the scrap is known to the trade, and the cost of bar or ingot steel, the advantages are evident."

The process was also tested on Bessemer steel. A pile was made of twelvepieces, one foot each, of English Bessemer rail ends, heated in the furnace for half an hour and welded solid under the hammer, with the preparation applied, into a bloom. This was reheated, cut in two, after being tested by upsetting, and made into a crank pin, which stands any test applied. The weight of the rail end was some two hundred pounds, and the steel was as tough and fine-grained as any first-class steel could be. Of a piece of Bessemer thus treated a chisel was made, which cut iron with the best. If these statements are true, the practical benefits of the discovery can scarcely be estimated.—*Pittsburgh Commercial.*

DOUBLE SULPHIDE OF POTASSIUM AND IRON.—By heating an intimate mixture of 5 parts of sulphur, 5 of potassic carbonate, and 1 part of fine iron filings, C. PREISS has succeeded in forming a double sulphide of potassium and iron, which crystallizes in red needles, has a metallic lustre, and resembles in appearance potassic permanganate. Its formula is KS, Fe_2S_3. The same compound has been obtained independently by R SCHNEIDER, who also has formed, by the replacement of iron by bismuth, the analagous compound, KS, Bi_2S_3.—*Pogg. Ann.*

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105,157.—SAFETY-CAP FOR CANS.—Horace C. Alexander, New York, N. Y.
105,158.—FAN-CASE FOR GRAIN AND SEED SEPARATORS.—Charles L. Allen, Flat Rock, Mich., assignor to himself and William Shick, same place.
105,159.—MACHINE FOR DRESSING STONE.—Alexander G. Anderson, Quincy, Ill., assignor to himself and A. W. Anderson.
105,160.—MANUFACTURE OF TOBACCO PAPER.—Ramon Antigüedad, New York, N. Y.
105,161.—AWL.—Samuel Babbitt, Brazil, Ind., assignor to himself and Joseph L. Hussey, same place.
105,162.—DOUBLE-ACTING FORCE PUMP.—Allen Bagley, Ypsilanti, Mich.
105,163.—WATER-WHEEL.—Joseph Bastion, Canton, N. Y.
105,164.—BIRD-CAGE.—Thomas H. Bradley, St. Louis, Mo.
105,165.—HORSE HAY-RAKE.—Alzirus Brown, Worcester, Mass.
105,166.—LATHE FOR TURNING WOOD.—John C. Brown, Washington, D. C.
105,167.—DAMPER.—Micajah C. Burleigh, Somersworth, N. H.
105,168.—MEDICAL COMPOUND.—Lucy J. Buttrill, Jackson, Ga.
105,169.—APPARATUS FOR TANNING.—John Campion, Woburn Centre, Mass.
105,170.—SUSPENSION GATE.—Edward Chadderdon, Howard, Mich., assignor for one-half to Albert Stineback.
105,171.—LANTERN.—David Challinor, Birmingham, Pa.
105,172.—COTTON-BALE TIE.—William Chambers, New Orleans, La.
105,173.—PRUNING-SHEARS.—Athanasius B. Chapman, Clyde, Ohio.
105,174.—MULEY-SAW HANGINGS.—Daniel Cilley, Osceola Mills, Pa.
105,175.—COFFEE POLISHER.—Edward J. Codd, Baltimore, Md.
105,176.—SPAWNING-SCREEN.—Alfred S. Collins, Caledonia, N. Y.
105,177.—SAFETY HOISTING APPARATUS.—Charles W. Copeland, New York, N. Y.
105,178, antedated June 30, 1870.—THILL-COUPLING.—Peter S. Crawford, Union, assignor to J. N. Widden, Rockford, Ill.
105,179.—CYLINDER STOVE.—John Currier and Abiel Pevey, Lowell, Mass.
105,180.—PROCESS AND APPARATUS FOR HARDENING FILES, &c.—Samuel Darling, Providence, R. I., assignor to Darling, Brown and Sharpe, same place.
105,181.—INJECTOR FOR STEAM-BOILERS.—Jean Pierre Floramond Datichy, Brooklyn, N. Y.
105,182.—APPARATUS FOR SPONGING CLOTH.—Isaac A. Davis, Philadelphia, Pa.
105,183.—ICE-CUTTING MACHINE.—Abraham Deutschel, Cleveland, Ohio.
105,184.—MOWER AND REAPER SICKLE-SHARPENER.—Elihu Doud, Oshkosh, Wis.
105,185.—SNOW-PLOW.—Jasper N. Drake, Liberty, Mich.
105,186.—MILLSTONE-DRESS.—William G. Dunniway and Harrison Osburn, New Cumberland, Ind.
105,187.—KNITTING-MACHINE.—William Franz, Bucyrus, and William Pope, Crestline, Ohio.
105,188.—BORING-MACHINE.—Joshua W. Frazee, Peoria, Ill.
105,189.—MACHINE FOR MAKING HORSE-SHOE NAILS.—Peter N. Gallaer and Isaac C. Tate, New London, Conn.
105,190.—GAS-MACHINE.—Joseph P. Gallagher, St. Louis, Mo.
105,191.—PESSARY.—William R. Gardner, Leonardsville, N. Y.
105,192.—SAD-IRON HANDLE.—Joel Gleason, Whitestone, N. Y.
105,193.—WASHING-MACHINE.—Isaiah W. Graffam, New Bedford, Mass.
105,194.—BOILER-TUBE CLEANER.—John Green, Boston, Mass.
105,195.—BRIDGE.—Thomas Briggs Gregory, Champaign, Ill.
105,196.—FRUIT-STRAINING APPARATUS.—Mary E. Grigsby, Putnamville, Ind.
105,197, antedated June 30, 1870.—COMBINED LATCH AND LOCK.—Theodor Hahn, New York, N. Y.
105,198.—HORSE-DETACHING APPARATUS.—John C. Hancock, Charlestown, and Edward P. Richardson, Somerville, Mass.
105,199.—ROD-COUPLING.—Francis J. Hanna, Petroleum Centre, Pa.
105,200.—SEEDING-MACHINE.—John D. Harrison, Middletown, Ohio.
105,201.—COMBINED HINGE AND RING FOR LOCKET.—George Hartje, New York, N. Y.
105,202.—CLIP FOR HARNESS.—Joseph S. Hayes, Williamsport, Pa., assignor to himself and Philip Miller, same place.
105,203.—FIRE-EXTINGUISHER.—Ludwig Herman, Detroit, Mich.
105,204.—OSCILLATING ENGINE.—Thomas Hill, Vallejo, Cal.
105,205.—GUARD FOR AX-HANDLES.—Lara B. Hoit, Cedar Falls, Iowa.
105,206.—SASH-HOLDER.—Josiah Honsinger, Harrisburg, Pa., assignor to Benjamin Honsinger, same place.
105,207.—FEED-WATER HEATER FOR LOCOMOTIVES.—James S. Hooton, New Carlisle, Ind.
105,208.—CRAB FOR HAND-HOLE PLATES.—James S. Hooton, New Carlisle, Ind.
105,209.—FEED-WATER FILTER.—James S. Hooton, New Carlisle, Ind.
105,210.—CLAP-BOARD GAUGE.—Emmet Horton, Dundee, N. Y.
105,211.—COTTON-HARVESTER.—Duncan Campbell Hubbard, Point Coupee Parish, La.
105,212.—CLASP FOR PAINT-BRUSH.—George W. Hupp, Elwood, Ind.
105,213.—KINDLING-FAGOT.—Clement R. Jacobi, Green Point, N. Y.
105,214.—STATION-INDICATOR.—Egbert Jamieson, Chicago, Ill.
105,215.—VENTILATOR.—Henry S. Janes, Oshkosh, Wis.
105,216, antedated June 29, 1870.—TEMPLETS FOR PANELING-MACHINE.—Nicholas Jenkins, New York, N. Y.
105,217.—WATER-CLOSET VALVULAR APPARATUS.—John Keane, New York, assignor to himself and George H. Brown, Milbrook, N. Y.
105,218.—KALEIDOSCOPE.—Matthias Keller, Boston, Mass., assignor to himself, Stoughton B. Holden, and Luther L. Holden.
105,219.—SOLDERING-KIT.—Michael D. Kelly, Cadiz, Ky.
105,220.—AUTOMATIC SLUICE-GATE.—Jacob Keplinger, Farmersville, Ohio.
105,221.—FARM-FENCE.—Peter Kidney, Olmsted Falls, Ohio.
105,222.—FOLDING SEAT.—George W. King, Oswego, N. Y., assignor for one-third of his right to A. P. Grant.
105,223.—DRIVING-GEAR WHEEL FOR CARPET-SWEEPERS.—Alfred J. Knight, Brooklyn, N. Y.
105,224.—FEVER AND AGUE MEDICINE.—Samuel Laighton, Newark, N. J.
105,225.—CULTIVATOR.—Jonathan Lewis, Washington, D. C.
105,226.—LEMON FRUIT SYRUP.—Schuyler W. Mahan, Adrian, Mich.
105,227.—RASPBERRY AND STRAWBERRY FRUIT SYRUP.—Schuyler W. Mahan, Adrian, Mich.
105,228.—CARRIAGE AND CAR-WHEELS AND AXLE-BOX.—James A. Maynard, Newtonville, Mass.
105,229.—COMBINED SEEDER, PLANTER, CULTIVATOR AND HARROW.—Jones K. McClure, Cornersville, Miss.
105,230.—FLOOD-FENCE.—Daniel J. Miller, Indianapolis, assignor of one-half interest to Fielding Beeler, Marion County, Ind.
105,231.—COMBINED FENDER AND FIRE-SCREEN.—Jacob Miller and William H. B. Flender, Washington, Pa.
105,232.—WEATHER-STRIP.—William Miller, Chicopee, Mass.
105,233.—FRAME FOR SENSITIZING PHOTOGRAPHIC PAPER.—Luther V. Moulton, Muskegon, Mich.
105,234.—FIRE-PLACE GRATE.—Emma Norman, New Orleans, La.
105,235.—SUCKER-ROD COUPLING.—Jacob Odell, Petroleum Centre, Pa.
105,236.—SHOE-STRING FASTENING.—Charles M. O'Hara, Bolivar, Tenn.
105,237.—PEN-RACK.—Mathew O'Reardon, New York, N. Y.
105,238.—APPARATUS FOR STAKING HORSE-POWERS.—Benjamin F. Osgood, Coloma, Mich.
105,239.—FARM-FENCE.—Thomas W. Owens, Granville, Ohio.
105,240, patented in England, April 21, 1868.—MACHINE FOR TIGHTENING ROPES, &c.—Arthur Paget, Loughborough, England.
105,241.—BRICK-KILN.—Caleb A. Parker, New Orleans, La.
105,242.—HARNESS-MAKERS' EDGING-TOOL.—Francis M. Patterson and Henry P. Miller, Seymour, Ind.
105,243.—STEAM-GENERATOR.—Robert Patterson, Catskill, N. Y.
105,244, antedated July 1, 1870.—MACHINE FOR SHARPENING THE TEETH OF SAWS.—Harford J. Perkins, Williamsport, Pa., assignor to George S. Snyder, same place.
105,245.—SAD-IRON HEATER.—Ezekiel Phillips, Blackstone, Mas.
105,246.—HOD-ELEVATOR.—Jesse Powers, Chicago, Ill.
105,247.—MANUFACTURE OF LEATHER.—William Pyle, Wilmington, Delaware.
105,248.—SCAFFOLDING.—Alfred Ray and Benjamin Franklin Monson, Shelbina, Mo.
105,249.—RAKING ATTACHMENT FOR FURNACE.—John Rice, Owego, N. Y.
105,250.—SPOOL MACHINE.—John F. C. Rider, South New Market, N. H., and Emerson P. Brownell, Providence, R. I.
105,251.—DUMB-HORSE VELOCIPEDE.—Samuel D. Roberts and Montgomery Dingee, Brooklyn, N. Y.
105,252.—BATTERY-INSULATOR.—Orris W. Robertson, Milwaukee, Wis.
105,253.—FOLDING CHAIR.—Augusta M. Rodgers, Brooklyn, N. Y.
105,254.—REFINING SUGAR.—John Rogers and Lawrence Reid, Brooklyn, N. Y.
105,255.—PRUNING-SHEARS.—John G. Rogers, Dowagiac, Mich.
105,256.—LAMP-CHIMNEY CLEANER.—James Ryan, Brookl'n, N. Y.
105,257.—CANDLESTICK.—Henry Rider, New Bedford, Mass.
105,258.—FAUCET.—Julius Schaefer and Gustav Schock, New York, N. Y.
105,259.—COUPLING FOR TUMBLING-SHAFTS.—Silas C. Schofield, Chicago, Ill.
105,260.—RAILROAD-CAR STOVE.—John. Q. C. Searle, Topeka, Kansas.
105,261.—SAW.—Simon W. Shailer, Deep River, Conn.
105,262.—CHURN.—Schuyler G. Shanks, Richmond, Ky.
105,263.—ENDLESS-CHAIN HORSE-POWER LINK.—Gilbert L. Sheldon, Hartsville, Mass.
105,264.—CAR-BRAKE.—Theo. E. Sickles, Kennett's Square, Pa.
105,265.—HUB-BORING MACHINE.—Albert R. Silver, Salem, Ohio.
105,266.—CARRIAGE-AXLE.—Alfred E. Smith, Bronxville, N. Y.
105,267.—MANUFACTURE OF IRON AND STEEL.—George H. Smith, New York, N. Y.
105,268.—PIPE-JOINT.—Hiram Smith, Norwalk, Ohio.
105,269, antedated June 28, 1870.—PACKING-CASE FOR PERFUMERY, &c.—Thomas P. Spencer, Jersey City, N. J.
105,270.—BRICK-REPRESSING MACHINE.—Andrew J. Sprague, Toledo, Ohio.
105,271.—BORING-TOOL.—Thomas E. Stanley, Hazlehurst, Miss.
105,272.—ELECTRO-MAGNETIC APPARATUS FOR REGULATING VALVES AND DAMPERS.—George Miller Sternberg, Fort Riley, Kansas.
105,273.—ELECTRICAL THERMOSTAT.—George Miller Sternberg, Fort Riley, Kansas.
105,274.—SUSPENSION PAPER-CLIPS.—William Stokes, New York.
105,275.—STEAM-GENERATOR.—George A. Stone, New York, N. Y.
105,276.—HORSE-POWER.—Solomon Stoner, Canton, Ohio.
105,277.—HYDRAULIC SEAL.—James H. Sutton, Honesdale, Pa.
105,278.—CAR-COUPLING.—Edward Davis Thompson, Lawrence, Kansas.
105,279.—FIRE-EXTINGUISHER.—Jacob Brill Van Dyne, Covington, Ky.
105,280.—FIRE-ESCAPE.—Lorenz Wahle, Davenport, Iowa.
105,281.—SAWING-MACHINE.—Lorenzo D. Webber, Deep River, Conn., assignor to himself and S. W. Shailer, same place.
105,282.—BRIDLE-BIT.—Benjamin F. Wheeler, Calais, Vt.
105,283.—MANUFACTURE OF FERTILIZERS.—Exum Whitley, Murfreesborough, N. C., assignor to himself and Charles H. Foster, same place.
105,284.—KNEE-LEVER FOR MELODEON OR ORGAN-SWELL.—Orison C. Whitney, Meadville, Pa.
105,285.—COMBINED CULTIVATOR AND CORN-DRILL.—Camden L. Wilcox, Wayne township, Ohio.
105,286.—MECHANISM FOR OPERATING BOOMS OF VESSELS.—James M. Wise, Wilmington, N. C.
105,287.—FOLDING CARRIAGE-TOP.—Thomas H. Wood, New York.
105,288.—SLEEPING-CAR.—Jonah Woodruff, Philadelphia, Pa.
105,289.—WATER REGULATOR AND ALARM.—William Wyatt, Nashville, Tenn.
105,290.—PIPE-COUPLING.—Wm. C. Allison, Philadelphia, Pa.
105,291.—TIME-LOCK.—Corydon F. Atwood, Hancock, Wis., assignor to James F. Wiley and Vincent C. Price.
105,292.—WOOD PAVEMENT.—William W. Ballard, Elmira, N. Y.
105,293.—DOUGH-KNEADER.—John H. Barr and Jacob H. Smith, Roanoke, Ind.
105,294.—CIRCULAR-SAW MILL.—Erasmus W. Beckett, McConnellaville, Ohio.
105,295.—GRATE-FENDER.—Samuel S. Bent, Port Chester, N. Y.
105,296.—BACK FOR FIRE-PLACE GRATE.—Samuel S. Bent, Port Chester, N. Y.
105,297.—FIRE-PLACE GRATE.—S. S. Bent, Port Chester, N. Y.
105,298.—MODE OF SECURING CARRIAGE-WHEELS ON THEIR AXLES.—Ira Bicknell, Cincinnati, Ohio.
105,299.—SASH-HOLDER.—G. W. Bishop, Saratoga Springs, N. Y.
105,300.—ELASTIC TRANSFER PRINTING.—David W. Bowdoin, Salem, Mass.
105,301.—WATER-WHEEL.—James Campbell, Rochester, N. Y.
105,302.—SAW-MILL.—Martin P. Campbell, Barrington, N. Y.
105,303.—FENCE.—John Wesley Cherry, Carthage, Ill.
105,304.—AUTOMATIC FEEDER AND INDICATOR FOR STEAM BOILERS.—Alfred D. Clark, Greenfield, Ohio.
105,305.—GAS HEATER.—John E. Cone, Chicago, Ill.
105,306.—CISTERN INFLUX-REGULATOR.—Andrew Jackson Conner, Louisville, Ky.
105,307.—FENCE.—S. Park Coon, Milwaukee, Wis., assignor to himself and David G. Power, same place.
105,308.—HAY-LOADER.—Emmett Cooper, Theresa, N. Y.
105,309.—SMOKING-PIPE.—Edward Cottam, Wimbledon, Eng.
105,310.—RESERVATORY FOR GROCERIES, &c.—Oliver R. Cowgill, Pana, Ill.
105,311.—GUARD-FINGER FOR HARVESTERS.—Addison Crosby, Westfield, N. Y.

105,312.—MACHINE FOR POLISHING NEEDLES.—Chauncy O. Crosby, New Haven, Conn.
105,313.—MACHINE FOR PAPERING NEEDLES.—Chauncy O. Crosby, New Haven, Conn.
105,314.—CORN-PLANTER.—Thomas Dale, Russellville, Ky.
105,315.—DUST-PAN.—Francis L. Daniels, Boston, Mass.
105,316.—CORN-PLANTER.—J. Addison Davis, Verona, Miss.
105,317.—ASH-PAN FOR LOCOMOTIVES.—Lon Hen Dee, Grand Junction, Iowa.
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105,321.—SEAT FOR VEHICLES.—Wm. H. Elliott, Beardstown, Ill.
105,322.—KEY.—Henry H. Elwell, South Norwalk, Conn.
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105,327.—STOVE-PIPE SHELF.—Robert B. Gorton, Niantic, Conn.
105,328.—BOTTLE-FILLING APPARATUS.—Charles Alexander Gregory, Poughkeepsie, N. Y.
105,329.—MACHINE FOR SEWING BOOKS.—Luther Hall, Boston, assignor to Alfred B Ely, Newton, Mass.
105,330.—SASH-BALANCE.—James C. M. Hamilton, Shaver's Creek, Pa.
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105,394.—HARVESTER.—W. N. Whiteley, Springfield, Ohio.
105,395.—HARVESTER.—W. N. Whiteley, Springfield, Ohio.
105,396.—HARVESTER-DROPPER.—William N. Whitely, Springfield, Ohio.
105,397.—FEED-WATER HEATED FOR STEAM-BOILERS.—Daniel Whitlock, Newark, N. J.
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105,400.—SHUTTER-WORKER.—Hermann Wolff, Milwaukee, Wis.
105,401.—PUMP.—Henry M. Wyeth, Newark, Ohio.
105,402.—TUCK-MARKER FOR SEWING-MACHINE.—Nathaniel Jones, Chicago, Ill.
105,403.—WASHING-MACHINE.—Wm. Vanscoyoc, Oxford, Ohio.

REISSUES.

4,065.—SPECTACLES.—Louis Black, Detroit, Mich.—Patent No. 96,387, dated November 2, 1869.
4,066.—CARPET-LINING.—George W. Chipman, Boston, Mass.—Patent No. 60,476, dated December 18, 1866.
4,067.—PROCESS OF EXTRACTING FATTY SUBSTANCES.—William Coffin, Glendale, N. J.—Assignee of Charles F. A. Simonin and Edward W. Coffin.—Patent No. 102,166, dated April 19, 1870.
4,068.—SAW.—James Davis, for himself, and Ford W. Davis, assignee of James Davis, Philadelphia, Pa.—Patent No. 72,283, dated January 7, 1868.
4,069.—MANUFACTURE OF STEEL.—William Fields, Wilmington, Patent No. 102,796, dated May 10, 1870.
4,070.—MACHINE FOR COMPRESSING CARRIAGE-WHEELS.—Henry Killam, New Haven, Conn.—Patent No. 69,818, dated October 15, 1867.
4,071.—WHIP-SOCKET.—John O. Merriam and Edwin Chamberlin, Troy, N. Y., assignees of Charles B. Morehouse.—Patent No. 52,489, dated February 6, 1866.
4,072.—MANUFACTURE OF GLUE.—Thomas P. Milligan and Thomas Higgins, Brooklyn, N. Y., assignees of Emerson Goddard.—Patent No. 44,528, dated October 4, 1864.
4,073.—CAR-COUPLING.—Manuel Van Slyke and David Woolsey Wood, Rome, N. Y.—Patent No. 96,514, dated November 2, 1869.

DESIGNS.

4,214.—DOOR-BELL.—William Allport, New Britain, Conn.
4,215.—SLATE-FRAME.—John M. Coffin, Lehigh Township, Pa.
4,216.—TRADE-MARK.—David M. Demarest, New York, N. Y., John J. Demarest, Jersey City and Nicholas H. Joralemon, Hoboken, New Jersey.
4,217.—GLASS LAMP-SHADE.—Chretian Dorflinger, Texas, Pa.
4,218.—HANDLE OF SPOONS, FORKS, LADLES, &c.—George W. Downing, New York, N. Y., assignor to the Redfield and Rice Manufacturing Company, same place.
4,219.—FOUNTAIN.—John Hegarty, Jersey City, N. J.
4,220.—FRAME FOR MOWING-MACHINE.—William G. Kenyon, Wakefield, R. I.
4,221.—KNIT SKATING-CAP.—Martin Landenberger, Philadelphia, Pa.
4,222.—FLOOR-CLOTH PATTERN.—Victor Meyer, Lansingburgh, N. Y., and Charles T. Meyer, Newark, N. J., assignors to Edward C. Sampson, New York city.
4,223.—PAPER-COLLAR BOX.—Wm. H. Richardson, Boston, Mas.
4,224.—KITCHEN-BOILER.—W. B. Scaife, Pittsburgh, Pa.

EXTENSIONS.

ISAAC A. DUNHAM, of North Bridgeport, Mass.—June 24, 1856.—"Improvement in Shoemaker's Edge Planes."
WM. H. THOMPSON, of Boston, Mass., and EUSTIS P. MORGAN of Biddeford, Me.—June 24, 1856.—Improvement in Safety Hatches for Warehouses.
Additional Improvement, dated April 14, 1857.
WM. T. CLOUGH, Newark, N. J.—July 1, 1856.—Improvement in Concentrating Apparatus for Sulphuric Acid.

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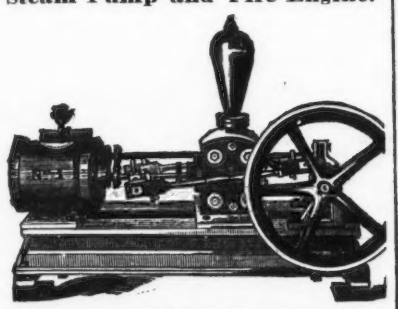

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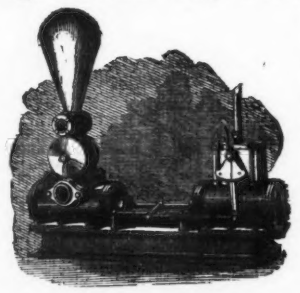

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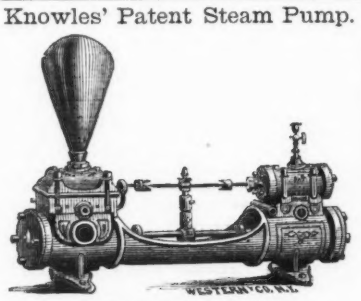

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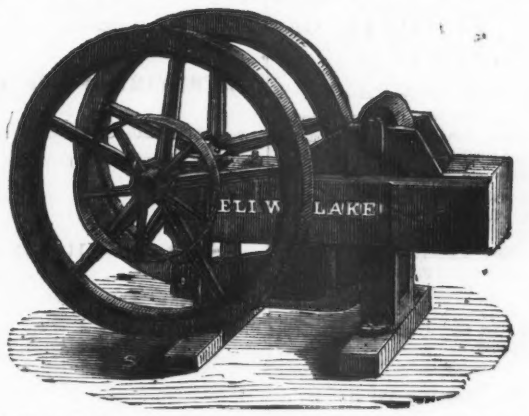

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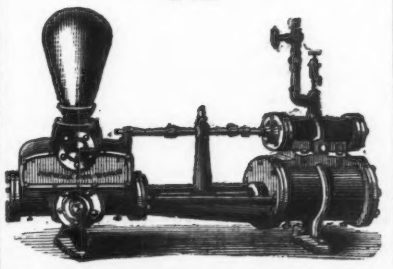

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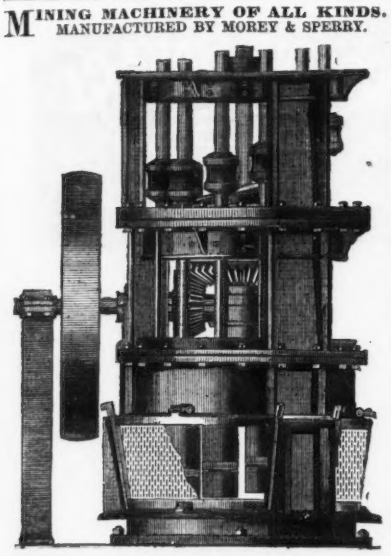

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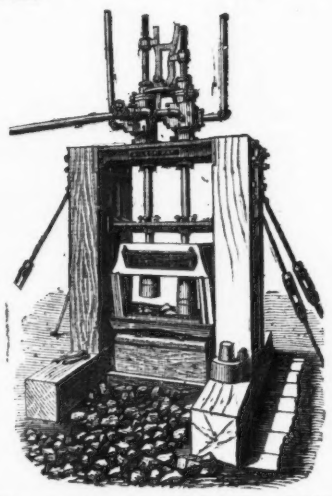

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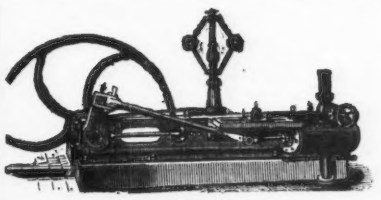

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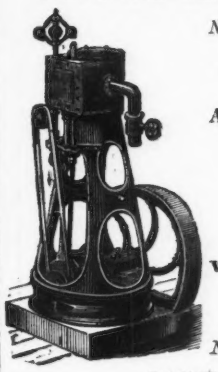

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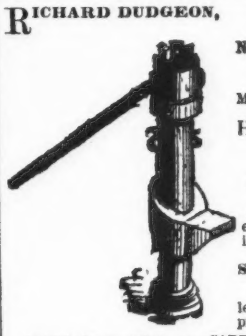

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Manufacturing Company of Penn

This Company is now prepared to furnish

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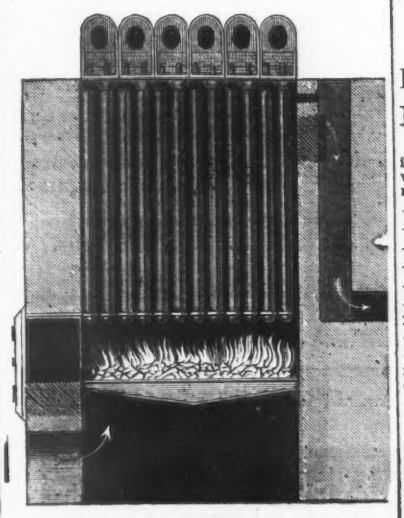

Patent Improved Steam Generator,

Of any power required, upon two weeks' notice. They have been introduced in this city and thoroughly tested, with most satisfactory results, and are sold under Guarantee of Absolute

Safety from Destructive Explosion.

They are cheaper in first cost and in expense of erection, more economical in fuel, durable and convenient in use, than any other apparatus for generating steam. For Mining purposes it is unequalled, owing to the facility with which it can be transported and erected.

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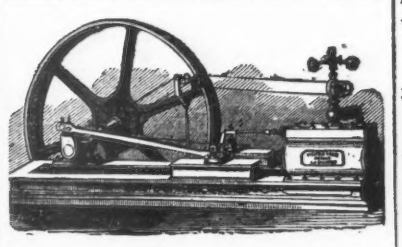

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It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. sep21-1y

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DEPARTMENT OF PUBLIC WORKS.
No. 237 BROADWAY,
NEW YORK, June 8, 1870.

To Plumbers and Masons.—Notice is hereby given to plumbers and masons holding licenses from the late Croton Aqueduct Board that, from and after this date, no permits for tapping water-pipes or for making connections with sewers or drains will be issued unless new bonds are filed with this department.

WM. M. TWEED,
jun21:4t Commissioner of Public Works.

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PROPOSALS.

DEPARTMENT OF PUBLIC WORKS, 237 Broadway.

TO CONTRACTORS.

Proposals enclosed in a sealed envelope, indorsed with the title of the work and the name of the bidder written thereon, (also the number of the work, as in the advertisement,) will be received at this office until Monday, July 25th, at 11 o'clock A.M., for the following work:

No. 1. For paving Eleventh avenue, from Thirty-third to Thirty-fourth street, with stone blocks.

No. 2. For paving Forsyth street, from Division to Houston street, with stone blocks.

No. 3. For paving Charlton street, from Macdougal to West street, with stone blocks.

No. 4. For paving Eightieth street, from Second to Third avenue, with stone blocks.

No. 5. For paving Fifty-second street, from Ninth to Eleventh avenue, with stone blocks.

No. 6. For paving Forty-seventh street, from Madison to Fifth Avenue.

No. 7. For paving Macdougal street, from Spring to Eighth street, with stone blocks.

No. 8. For paving Thirty-ninth street, from Seventh to Eighth avenue, with stone blocks.

No. 9. For sewer in Fortieth street, from Eleventh Avenue to Hudson River.

No. 10. For Sewer in Clinton street, from Stanton to Rivington street.

No. 11. For sewer in First avenue, from Forty-ninth to Fiftieth street.

No. 12. For sewer in Sixty-fifth street, from Eighth to Ninth avenue.

No. 13. For sewer in Oak street, from James to Oliver street.

No. 14. For sewer in Centre street, from Broome to Grand street.

No. 15. For regulating, grading, curb, gutter, &c., Worth street, from Chatham square to Baxter street.

No. 16. For regulating, grading, curb and gutter, &c., Tenth avenue, from Manhattan street to 155th street.

No. 17. For regulating, grading curb and gutter, &c., Seventy-second street, from Third avenue to East River.

No. 18. For regulating grading, curb and gutter, &c., 126th street, from Second avenue to Eighth avenue.

No. 19. For regulating, grading, curb and gutter, &c., Sixtieth street, from Tenth avenue to Hudson River.

No. 20. For regulating, grading, curb and gutter, &c., 112th street, from Second avenue to Harlem River.

No. 21. For regulating, grading, curb and gutter, &c., Eighty-first street, from Second avenue to East River.

No. 22. For regulating, grading, curb and gutter, &c., Twenty-second street, from Eleventh avenue to Hudson River.

Blank forms of proposals, together with the specifications and agreements, can be obtained on application at this office.

WILLIAM M. TWEED,
Commissioner.

New York, July 14th, 1870.

DEPARTMENT OF PUBLIC WORKS, 237 BROADWAY.—TO CONTRACTORS.—Proposals for building Stone Bridge over Spuyten Duyvil Creek, on site of King's Bridge. Proposals for the above, inclosed in sealed envelope, endersed "Proposals for building Stone Bridge over Spuyten Duyvil Creek, on site of King's Bridge," with the name of the bidder written thereon, will be received at the office of the Commissioner of Public Works, until 11 o'clock, A. M. of Monday, July 25th, 1870, at which hour the bids will be publicly opened and read, and the award of the contract made as soon thereafter as practicable.

WILLIAM M. TWEED,
Commissioner of Public Works.
Department of Public Works, July 14, 1870.

A NEW 20 HORSE POWER STEAM ENGINE fitted with "Metaline." NO OIL OR GREASE required, for sale by

FRANKLIN E. BRADSHAW,
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Extensively used in the British Navy and by the leading Manufacturers, Shipbuilders, and Steamship Companies of Great Britain and the Continent; and since its introduction in America it has given universal satisfaction. In witness whereof see pamphlet containing names and testimonials, to be had by applying to

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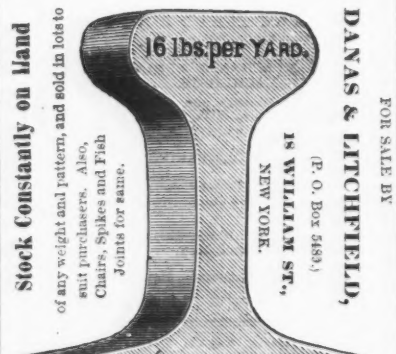
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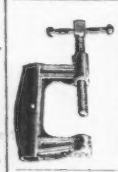

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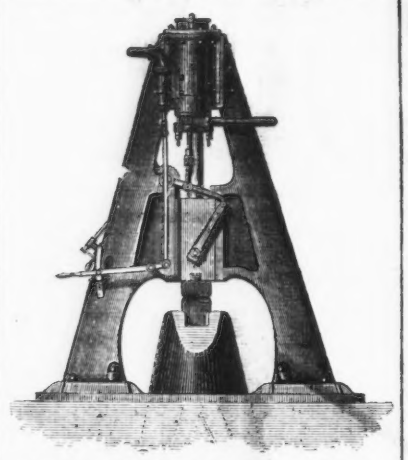

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Fifty Blows Per Minute and no Crushing or Shattering.

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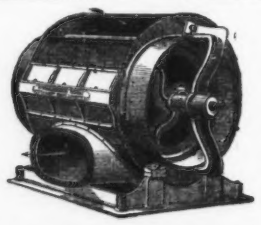

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These Saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established

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AND
STATEN ISLAND
Clay Retort Works.
Established 1845.

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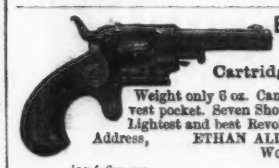

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